Af73

BARTONIA

29-41

1957-72

MISSOURI BOTANICAL
GARDEN LIBRARY

SHOUT
SHARE
IT

QK1
.B156
no. 29
-41

No. 29 1957-58

BARTONIA

JOURNAL OF THE PHILADELPHIA BOTANICAL CLUB

CONTENTS

A Study of Utricularia olivacea .... Ruth McV. Allen 1

Goose Pond Saved .... E. T. W. 2

Dionaea Transplants in the New Jersey Pine Barrens ...... Dorothy S. Evert 3

One Hundred "Lost" Local Plants .... Edgar T. Wherry 5

Bowmans Hill Silver Anniversary .... E. T. W. 8

Local Flora Vandalism .... P. B. C. Committee 9

An English Obituary Account of Thomas Nuttall
John W. Thieret and C. Earle Smith, Jr. 10

Walter Steckbeck—An Appreciation .... Martha S. Lewis 11

Philadelphia Botanical Club Records 14

Published by the Club
Academy of Natural Sciences, Nineteenth and the Parkway
Philadelphia
Subscription Price, $1.00. Back numbers, $1.00 each.
Issued December 16, 1959

MISSOURI BOTANICAL
RECEIVED
FEB 13 1961
GARDEN LIBRARY

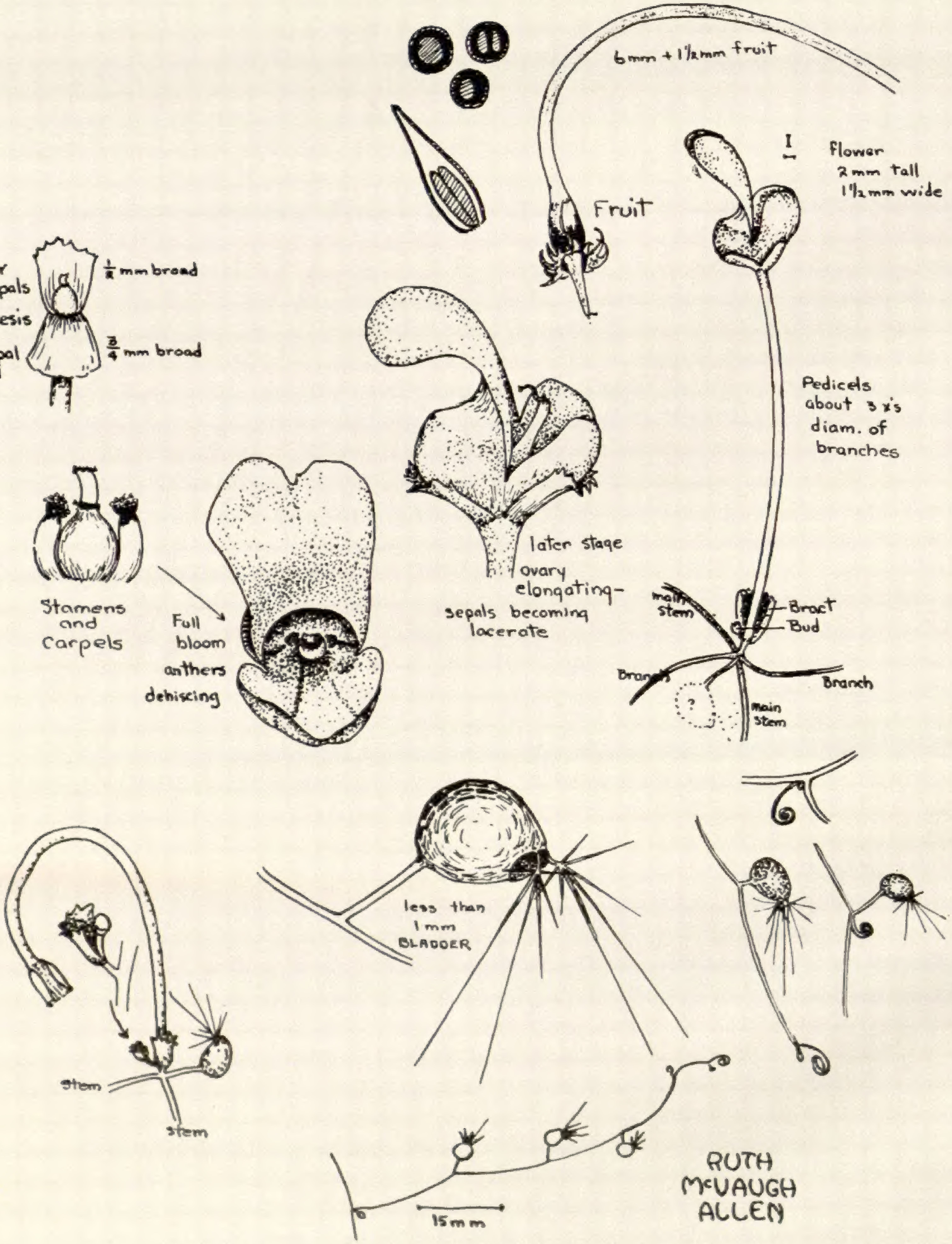

6mm + 1½mm fruit
Fruit
I
Flower
2mm tall
1½mm wide
ovary
and sepals
at anthesis
one sepal
turned
down
½ mm broad
¾ mm broad
Pedicels
about 3 x's
diam. of
branches
Stamens
and
Carpels
Full
bloom
anthers
dehiscing
later stage
ovary
elongating-
sepals becoming
lacerate
main
stem
Bract
Bud
Branch
Branch
?
main
stem
less than
1 mm
BLADDER
stem
stem
15mm
RUTH
McVAUGH
ALLEN

PLATE 1. *Utricularia olivacea* from Goose Pond, New Jersey

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

No. 29 1957–58

A Study of Utricularia olivacea

Ruth McV. Allen
Riverton, N. J.

Stem: Capillary, branching.

Leaves: All modified to bladders, borne alternately on stalks shorter than to as long as the body, which is barely 1 mm. in diameter. Faucial spurs 2, each bearing about 6 flagellae 0.5 to 2 mm. long.

Inflorescence consisting of a solitary flower (or rarely of 2) borne on a thickish pedicel up to 10 mm. long. Bract obovate, its truncate apex lacerate-dentate.

Flower about 2 mm. high and 1.5 mm. wide, complete, hypogynous, zygomorphic.

Sepals 2, petaloid, white, about 0.75 mm. long, one the same in width, the other slightly narrower; in fruit becoming firm, recurved, and deeply lacerate at tip.

Petals 4, creamy white, united to form two bilobate lips, both of which extend upward; lower lip not spurred but basally saccate, its distal portion recurved over the pouch, bearing basally two widely divergent translucent lines; upper lip much shorter, concave, bearing similar translucent lines which diverge so as to divide it into 3 subequal segments.

Androecium: Stamens 2, adnate to the corolla at very base, their filament curving outward and then inward so as to bring the anthers close to the stigma at early anthesis; anthers unilocular. Upper part of filament and whole anther maroon-tinged.

Gynoecium: Bicarpellate, the ovary unilocular, at anthesis spherical; style very short. After fertilization ovary elongating to form a hollow conical tip, becoming up to 4 times its original length. Ovules 2, the character which has led some taxonomists to place this species in an independent genus, *Biovularia*.

Goose Pond Saved

The Goose Pond here referred to lies about two miles west-southwest of Egg Harbor City, New Jersey. Its botanical interest was discovered by Frank and Robert Hirst, amateur botanists residing in Atlantic County. A full account of its flora has not yet been compiled, but it contains colonies of several southern species not heretofore known this far north, *e.g.,* Maiden Cane (*Panicum hemitomum*) as well as a Lobelia (*Lobelia boykinii*), never before found in the state.

In 1958 local naturalists learned to their dismay that the tract of land on which the pond is situated was to be put up for sale by the township, ostensibly for developing commercial cranberry bogs, which would mean changing the water level to such an extent as to injure or destroy the rare plants there. This situation was brought to the attention of Richard Pough, of Wild Life Preserves, Inc., and that organization succeeded in obtaining an option on the property, saving it from damage until such time as funds are forthcoming for its purchase and setting aside as a nature sanctuary.

In September, 1959, on being asked to identify a tiny bladderwort discovered by the Hirst brothers floating just under the water surface of Goose Pond, I thought of *Utricularia* (*Biovularia*) *olivacea,* " One of the smallest (perhaps the smallest by weight) of all flowering plants." It was first found in Cuba and was recorded in the U. S. only from near Sanford, Seminole County, Florida; could this New Jersey plant possibly represent a disjunct northern occurrence of the same taxon?

A positive answer was soon forthcoming: Mrs. Allen made detailed drawings and measurements of its parts, which proved to correspond so closely to those published by Barnhart in the Memoirs of the New York Botanical Garden, vol. 6, and in Small's Manual of the Southeastern Flora, as to leave no doubt. She also took kodachromes of the flowers and fruits—the first time in botanical history that it had ever been photographed—and showed these at the meeting of the Club September 24, 1959.

How fortunate it is that such a locality has been preserved; for who knows how many other rare plants remain to be found there? The Hirst brothers deserve the warmest thanks of every local botanist, not only for their efforts which culminated in the saving of this area, but also for their intensive study of the Pine Barren flora, which has resulted in the rediscovery of several reputedly " lost " species, as well as the finding of many new localities. They will be glad to guide anyone who agrees not to disturb rare plants; addresses: Frank Hirst, 52 E. Park Ave.; Robert Hirst, 511 Roosevelt Ave., both in Pleasantville, New Jersey.—E. T. W.

Dionaea Transplants in the New Jersey Pine Barrens

Dorothy S. Evert

Riverton, N. J.

With the assistance of man a new species is being noted in Southern New Jersey. Heretofore growing only in the Carolinas, Venus fly trap (*Dionaea muscipula*) is finding the acid soil of the Barrens and its fringe area quite satisfactory for its growth. Apparently perfectly capable of withstanding our lower winter temperatures, most of the known stations are increasing.

The first known planting was made in 1948 by Dr. Th. Ph. Haas of the Philadelphia College of Pharmacy and Science. Mature plants were secured near Wilmington, North Carolina early in August and planted in Oceanville Bog, a small, mostly open, sunny bog fringed with Southern White-Cedar (*Chamaecyparis thyoides*), the natural habitat of several orchids, bladderworts, also the curly grass fern (*Schizaea pusilla*) with its companion club moss (*Lycopodium carolinianum*). Checks made in 1957 and 1958 showed many seedlings, at least twelve of blooming size. The original plants were removed by vandals, but fortunately seeds had germinated before this occurred.

Mr. David Fables, Assistant Professor of Biology at Union Junior College, reports on his seven-year-later transplants as follows:

" Normally I do not approve of placing plants in areas that are extra-territorial. However, in 1953 on a visit to the Wilmington, North Carolina area where *Dionaea* was formerly abundant, I was informed by Mrs. Cecil Appleberry that it was definitely declining due to destruction of habitat and commercial collecting. She feared its eventual extinction if the trend continued.

" En route home from that visit I came to a section of Route 17 north of Wilmington where *Dionaea* was growing in abundance close to the road. Bulldozers were at work a few hundred feet distant and would shortly destroy the station in their road-widening activity. I decided to rescue some, bring it to the New Jersey Pine Barrens, and plant it at several seemingly suitable localities so that the eventual extinction of the species would be less likely. Four *Dionaea*, and one *Sarracenia flava*, were collected.

" Two of the *Dionaea* were planted close to Webb's Mill branch of Cedar Creek east of a highway. One of these was placed in an exposed position (full sun) in damp sand; the second in an area surrounded by huckleberry bushes and overtopped by pitch pine (*Pinus rigida*), where the soil was not quite as wet as the other area. *Sarracenia flava* was placed in the second spot. A third *Dionaea* was placed in a wet cedar bog on the South branch of Forked River, Ocean County, west of a highway.

"The fourth was placed in a rather remote white cedar (*Chamaecyparis thyoides*) swamp southeast of Lakehurst, Ocean County. This was planted on a small clump of sandy soil above the water level,—a typical *Schizaea* spot."

A survey of Mr. Fables transplants, in 1958, shows: Webb's Mill branch,—two *Dionaea* flowered; both in light shade. Forked River, no *Dionaea* observed after 1953. Lakehurst,—three *Dionaea* plants, one flowering.

Mr. Fables states, "It seems as though the Lakehurst Colony is beginning to multiply, as is also the Webb's Mill colony located in meagre shade. *Sarracenia flava* is barely holding its own."

On the shore of Cedar Run Lake, Burlington County, the property of Mr. and Mrs. James Woodford, *Dionaea* is also increasing. In May, 1954 Mrs. Woodford received three mature plants and placed them along the shaded side of a flowing spring. In 1958 only one small plant remained. The deer which frequent this area were blamed for their near-disappearance, although possibly the lack of sunlight and the coldness of the spring aided their demise. In 1956 Mrs. Woodford planted five *Dionaea* in a new location (and protected them with a wire enclosure). This station is on a slight slope of moist ground three feet from the lake and facing east. Mrs. Woodford reports, "By 1957 all original plants were living, two had doubled their size, and one had a small new plant beneath its leaves. By 1958 there were eight healthy plants, with nine bloom stalks, and two more seedlings." Three plants of *Sarracenia flava* are also living in this area with *Drosera filiformis*,—all in acid sphagnum moss.

I have been told that a planting was made on the edge of Chatsworth Lake, in Burlington County, a few years back but field trips to that area in 1957 and 1958 were unproductive. This is not to say that future search may not prove it to be still alive, although this area had a destructive fire in 1954.

In February of 1959 I purchased from the Rex Pearce Seed Company of Moorestown, New Jersey one dormant *Dionaea* plant. Mr. Oliver Stark of that company gave me another plant to dissect. These were kept in a heated sunroom facing east in a large dish filled with sphagnum moss from the Pine Barrens. The moss was kept moist, with the plants retained in their original pots. By early April one plant was in bloom. Occasionally a small ant or fly was dropped on the leaf and the juice of the insect was extracted by it. This *Dionaea* will be transplanted to Braddock's Mill Lake, a few hundred feet from Cedar Run Lake, on the property of Mr. and Mrs. Malcolm Bradley. The other plant was dissected while in the bud stage.

To lessen the chance of vandalism, only approximate data as to the localities are here given; but it seems wise to publish these notes so that when future botanists chance to come upon this plant, they will realize that they have not discovered a new member of the native flora of New Jersey.

One Hundred "Lost" Local Plants[1]

EDGAR T. WHERRY
University of Pennsylvania

This article comprises a list of native plants which have been found in certain southeastern Pennsylvania counties within 30 miles or so of Philadelphia, but have not been seen there for 20 years or more (although in some cases they are still known in other nearby counties). No doubt many of them are extinct, yet occasional rediscoveries suggest that search for them might be rewarding. For example, Squirrel Corn (*Dicentra canadensis*) reported by Darlington as having been found in Chester County in 1829 (and not represented by a voucher specimen) was rediscovered in 1958. Cranefly Orchid (*Tipularia discolor*), last collected in Delaware County in 1867, turned up again in 1956. And Stiff Goldenrod (*Solidago rigida*), not seen in Bucks County since 1914, was detected in winter condition by Bayard Long in 1956, and obtained in bloom the next season.

In the accompanying tabulation the plant names are taken from Gray's Manual, ed. 8, 1950. The families are arranged in systematic sequence, but within each the genera and species are listed alphabetically. The 5 counties considered are represented by 2 letters each. The localities are stated in abbreviated form; more exact data can sometimes be obtained from the labels on the sheets in the Academy of Natural Sciences local herbarium, or in that of the University of Pennsylvania, from one or both of which most of the dates of last collection were obtained. Records not in these herbaria are marked by *.

Plant names	CO. & locality		Last collected
Selaginella rupestris	DE.	Chadds Ford, s.	14 Feb., 1937
Isoetes riparia var. *canad.*	BU.	Yardley, nw.	8 Nov., 1931
Ophioglossum vulgatum	DE.	Lima, ne.	6 July, 1907
Lygodium palmatum	BU.	Yardley, sse.	24 Nov., 1923
Dryopteris phegopteris	PH.	Wissahickon (upper)	28 Aug., 1907
Woodsia ilvensis	CH.	Black Rock*	(ca. 1850)
Sparganium androcladum	BU.	Bristol	11 July, 1874
Eriophorum virginicum	CH.	Oldmixon bog	23 Aug., 1903
Lemna perpusilla	PH.	League Island	4 Oct., 1868
Lemna trisulca	CH.	Brooks Mill	7 Oct., 1922
Xyris caroliniana	BU.	Turkey Hill	1 Sept., 1921
Xyris torta	BU.	Morrisville, sw.	27 Sept., 1924
Allium cernuum	PH.	West Park	10 June, 1892
Amianthium muscaetoxicum	BU.	Tullytown	30 May, 1913
Lilium philadelphicum	MO.	Abington	24 June, 1923
Melanthium hybridum	DE.	Springfield	23 July, 1903
Melanthium virginicum	BU.	Finland	6 Sept., 1923

---

[1] Presented, with lantern slide illustrations, at the meeting of the Club, December 19, 1957.

Plant names	CO. & locality	Last collected
Smilacina stellata	MO. Red Hill	9 May, 1923
Corallorhiza wisteriana	PH. West Park	4 May, 1890
Habenaria cristata	MO. Frazier's Bog	14 Aug., 1902
Habenaria fimbriata	MO. Sumneytown, 2 mi. e.	4 July, 1922
Habenaria orbiculata	CH. King-of-Prussia	20 June, 1936
Habenaria psycodes	BU. Point Pleasant	11 July, 1898
Isotria medeoloides	MO. Frazier's Bog vic.	26 May, 1929
Listera australis	CH. North Valley Hill	ca. 1851
Spiranthes lucida	CH. Pomeroy, 1 mi. e.	19 June, 1926
Spiranthes tuberosa	CH. Sadsburyville, n.	5 Oct., 1924
Triphora trianthophora	CH. Caln Mtg. House	17 Aug., 1902
Castanea pumila	BU. Bridgewater	30 Sept., 1915
Coptis groenlandica	CH. Harmonyville	3 July, 1927
Ranunculus fascicularis	MO. Evansburg, cr. ab.	12 May, 1917
Ranunculus pensylvanicus	BU. Andalusia	ca. 1865
Trollius laxus	BU. Pleasant Valley, nw.	9 June, 1923
Arabis missouriensis	MO. Linfield	1 May, 1915
Arabis patens	CH. Brooks Mill	4 July, 1928
Sarracenia purpurea	MO. Green Lane, bog w.	21 June, 1920
Drosera intermedia	DE. Tinicum	31 Aug., 1902
Parnassia glauca	BU. Pleasant Valley, nw.	7 Oct., 1939
Waldsteinia fragarioides	MO. Green Lane, 1 mi. w.	12 May, 1935
Clitoria mariana	PH. Lemon Hill	1 July, 1833
Lathyrus palustris	PH. Byberry	ca. 1864
Lathyrus p. v. *myrtifolius*	BU. Tullytown, 1¾ mi. ab.	7 Aug., 1925
Vicia caroliniana	BU. Springtown, 2 mi. e.	21 May, 1933
Linum sulcatum	DE. Radnor, 1 mi. n.	14 Oct., 1921
Polygala cruciata	BU. Yardley, ½ mi. s.	28 Aug., 1923
Polygala lutea	BU. Bristol	1 July, 1866
Polygala nuttallii	BU. Edgely	28 Aug., 1923
Polygala polygama	PH. " Park "	1 July, 1944
Ilex glabra	BU. Bristol	1 July, 1866
Ilex laevigata	BU. Fallsington, sw.	16 July, 1932
Kosteletzkya virginica	PH. Navy Yard (old)	26 Sept., 1868
Ascyrum stans	BU. Bristol	28 Aug., 1864
Hypericum adpressum	BU. Bristol	15 Aug., 1908
Hypericum boreale	BU. Bristol, gravel pit	6 Sept., 1927
Hypericum denticulatum	BU. Bristol	1 Aug., 1866
Hypericum dissimulatum	BU. Fallsington, sw.	3 Oct., 1931
Hypericum ellipticum	DE. Essington	10 July, 1914
Hypericum virginicum	BU. Fallsington	16 July, 1932
Lechea intermedia	CH. Bradford Hills	2 Oct., 1910

Plant names	CO. & locality	Last collected
Viola incognita	PH. Miquon, se.	18 Apr., 1934
Viola emarginata	BU. Yardley, 2 mi. se.	28 Sept., 1923
Rotala ramosior	BU. Bristol	14 Sept., 1924
Epilobium glandulosum	MO. Souderton	27 June, 1923
Ludwigia sphaerocarpa	BU. Bristol	5 Aug., 1866
Oenothera pilosella	MO. Finland	29 June, 1921
Myriophyllum heterophyllum	BU. Tullytown, s.	4 Aug., 1927
Proserpinaca pectinata	BU. Bristol	ca. 1865
Aralia hispida	CH. Coatesville, ½ mi. n.	4 July, 1931
Angelica atropurpurea	CH. Copes Bridge	17 July, 1934
Eryngium aquaticum	DE. Tinicum	20 Aug., 1874
Hydrocotyle umbellata	BU. Bridge Valley	11 Oct., 1924
Gaylussacia dumosa	MO. Willow Grove	23 July, 1893
Pyrola secunda	PH. Wissahickon, 1 mi. up	1 May, 1864
Pyrola virens	CH. Nottingham	5 Sept., 1938
Dodecatheon amethystinum	MO. Ivy Rock	6 May, 1906
Hottonia inflata	BU. Oxford Valley, e.	1 July, 1931
Gentiana flavida	BU. Durham	14 Sept., 1888
Menyanthes trifoliata	PH. Pastorius meadow	ca. 1829
Nymphoides cordata	BU. Bristol	11 July, 1874
Sabbatia campanulata	BU. Bristol	17 July, 1908
Sabatia stellaris	BU. Tullytown	9 Aug., 1904
Asclepias rubra	DE. Haverford Township	8 Aug., 1908
Phlox stolonifera	CH. Paoli, 1½ mi. se.*	ca. 1865
Blephilia ciliata	CH. Thorndale	18 June, 1905
Blephilia hirsuta	CH. Paoli	4 Sept., 1908
Pycnanthemum pilosum	CH. Landenberg, 2 mi. s.	2 Aug., 1930
Pycnanthemum torrei	BU. Mozart	1 Aug., 1893
Scutellaria epilobiifolia	BU. Tullytown, ab.	7 Aug., 1925
Buchnera americana	BU. Upper Black Eddy	3 Aug., 1925
Utricularia fibrosa	BU. Tullytown	16 Aug., 1896
Utricularia gibba	BU. Tullytown	22 Aug., 1903
Utricularia infl. v. *minor*	BU. Bristol	8 July, 1927
Utricularia intermedia	BU. Penn Valley	1 June, 1899
Triosteum angustifolium	MO. Green Lane	30 May, 1920
Aster radula	CH. Brandamore	26 July, 1925
Coreopsis rosea	BU. Bristol, 1½ mi. sw.	19 Aug., 1866
Eupatorium leucolepis	BU. Bristol	4 Aug., 1927
Eupatorium rotundifolium	BU. Bristol, ½ mi. w.	21 Aug., 1938
Helianthus angustifolius	BU. Tullytown	17 Sept., 1898
Solidago rigida	MO. Green Lane	16 Sept., 1905

Silver Anniversary of the Bowmans Hill State Wild Flower Preserve

Early in the 1930's the Council for the Preservation of Natural Beauty in Pennsylvania,* under the Chairmanship of Mrs. C. C. Zantzinger, formulated a project of developing a Wild Flower Preserve, where the species of plants native to the State might be brought together and grown under as nearly natural conditions as practicable. For this a tract on the north side of Bowmans Hill, in the northern division of Washington Crossing State Park, was selected. A formal agreement to carry out this project was made by the Council and the Washington Crossing Park Commission on October 28, 1934, so just before this issue of Bartonia went to press the Silver Anniversary of the Preserve was celebrated. The program was splendidly planned and carried out by Mrs. L. R. Holmes.

On the morning of Wednesday, October 28, 1959, there was a meeting in the new Museum building near the Park Headquarters, attended by over three hundred conservationists and horticulturists, including nine of the Preserve founders. Then there was a luncheon at the nearby Washington Crossing Inn, followed by an address by Dr. Henry T. Skinner, Director of the U. S. National Arboretum.

Bowmans Hill State Wild Flower Preserve comprises a tract of 100 acres on the north slope and base of this hill, situated along the Delaware River 2½ miles south of New Hope, Bucks Co. About 300 species of native plants were found to grow naturally there, and several hundred more have been introduced by now. The underlying formations there comprise trap rock, shale, and river-terrace gravel; special habitats have been created for plants requiring them by bringing in limestone, sandstone, peat, etc. Over a dozen trails from 100 to 1000 feet or so long have been laid out, winding through the woods and fields.

By no means all the plants brought in have survived, for various reasons. Some have been planted in unfavorable habitats, others have been destroyed by weeds or by animals. The most serious of the former is Japanese Honeysuckle of which tons have been removed, but which will need permanent control. Coarse rhizomatous grasses have posed a difficult problem, and a recent arrival, Japanese Stilt-grass (*Eulalia viminea*) is especially ominous. The chief animal damage arises from deer, rabbits and mice, although groundhogs and muskrats are also destructive. Perhaps brats and bratellas (and their adult counterparts) who will not keep to the trails and so trample plants to death should be added.

While at first it was hoped that interesting species along the trails could be labelled, this proved out of the question, for among the thousands of well-mannered visitors, there is a small but alas significant number who can not resist the urge to destroy, and so remove either the label or the plant. It has been necessary, therefore, to mark plants by letters and numbers painted on rocks or well-anchored stakes, and then furnish leaflets giving the corresponding species names.

In spite of difficulties and problems, however, the project has given so much inspiration and information to hosts of naturalists, photographers, and outdoor enthusiasts in general that it is to be rated as a real success.—E.T.W.

---

* Now renamed the Conservation Council of Pennsylvania.

Local Flora Vandalism

For many years, those of us familiar with the occurrence of rare species in the Philadelphia Local Flora area of Pennsylvania and New Jersey have from time to time received letters from residents of distant points requesting guidance to localities of individual species. We have always been glad to oblige, in that they wished to observe the plants in their native haunts, to take photographs of them, and to collect at most single herbarium specimens. None of our guests has ever damaged or destroyed the plants shown to them.

Recently, however, on taking naturalists to once dependable stations, it has often been found that the plants have largely disappeared, to the disappointment of guide and visitor alike. Piecing together bits of evidence gathered from here and there, the most outrageous case of vandalism in the history of the local flora area proves to be going on.

A wealthy resident of a New York City suburb has set about transplanting to his garden *in maximum quantity* every rare plant he can learn about. Let us call him J. V. (for vandal) Doe. When some group of naturalists or Botanical Club stages a field trip to observe a locality of interesting plants, he sends a spy along, who makes note of the location. A day or two later J.V. visits the place, ties white cords on trees or bushes at the nearest point on a road, and sets small wooden stakes with white-painted tip alongside *every individual* of the rare species he can see. In due time a truck appears, stops at the cord-marked spot, and the men in it dig the staked plants and haul them off to J.V.'s garden.

To mention but two cases, several hundred plants of the Pine Barren Gentian have been thus removed from the Atsion, New Jersey, area; and, " most unkindest cut of all," in 1959 the remarkable colony of *Habenaria integra* at Sims Place suffered the same fate. Why does he deem it necessary to take them all? They will not live in his garden more than a year or two, and it may take 10 or 20 years for seedlings that he missed to grow to maturity in the ravished colonies. Should we receive letters from nature photographers asking to be shown the Golden Fringeless Orchid next summer, we shall have to reply, paraphrasing:

" All we can say, and say it to his shame,
Is, there was beauty here 'til J. V. came."

What can be done about it? Certainly any naturalist coming upon J. V.'s cords and stakes should contact the land owner, or if as often happens he can not be immediately located, then call a state policeman and in their presence remove these markers. Both Pennsylvania and New Jersey have trespass laws which could be enforced in a case like this. Should anyone chance to contact J. V. or his henchmen, these should be urged to be more considerate of the rights of others, and leave reasonable numbers of rare species undisturbed.—Prepared by a Committee of the Philadelphia Botanical Club.

An English Obituary Account of Thomas Nuttall (Concluding Part)

John W. Thieret and C. Earle Smith, Jr.

Chicago Natural History Museum

About 1935 W. L. Jepson discovered, in the files of biographic separates at Kew, part one of an obituary account of Thomas Nuttall that was issued originally in the " Settle Chronicle and North Ribblesdale Advertiser " and was subscribed " to be concluded next month." This part of the account was published by F. W. Pennell in Bartonia 19: 50–53 (1937). Dr. Pennell tried unsuccessfully to track down the concluding portion of the obituary.

While assembling an article and bibliography noting the centennial of the death of Thomas Nuttall (1786–1859), we made an effort to find this concluding section. A letter to the Settle Public Library, forwarded to the West Riding County Library, Wakefield, Yorkshire, Great Britain, elicited the reply from Mr. W. J. Murison that the " Settle Chronicle " is a rare, unlisted item. Through the initiative of his staff, and the generosity of Mr. E. Simpson, who has a file of the periodical, Mr. Murison provided us with a typescript of the concluding section of the Nuttall obituary from the " Settle Chronicle and North Ribblesdale Advertiser," no. 85, for February 1, 1861. Our most sincere thanks go to Mr. Murison and his staff for their detective work. We gratefully acknowledge Mr. Simpson's kindness in allowing the typescript to be made from his periodical file.

We must admit that this concluding section is disappointing. It does not fulfill Dr. Pennell's hopes and provide " direct information of [Nuttall's] estate and life at Nut-Grove Hall." Indeed, it gives us nothing new. The bulk of the account is reprinted directly from Durand's " Biographical notice of the late Thomas Nuttall " (Proc. Amer. Philos. Soc. 7: 297–315. 1860), beginning with the sentence " I shall not follow our bold adventurers in their long and perilous journey . . .' (p. 310 of the Durand account). The remainder contains some of the Rev. R. P. Crockett's remarks at Nuttall's funeral and gives no useful information.

We have sent copies of the concluding section of the obituary to the Royal Botanic Gardens at Kew and to the Academy of Natural Sciences of Philadelphia. The original typescript is on file in the botany library of Chicago Natural History Museum.

Dr. Walter Steckbeck—An Appreciation

MARTHA SERENE LEWIS
Strafford, Pa.

There are many kinds of teachers and not all are educators. To be an educator entails a certain amount of self sacrifice and frequently prevents one from writing the books he would like to write, and also from experimenting in laboratories. Dr. David Walter Steckbeck was a truly great teacher as well as one of the greatest educators.

Typical is a story of his experience with one of his pupils which is characteristic of the man. This pupil was a young woman, not too bright, but interested in Botany. She was in the College Collateral courses and was working for her degree of B.S. She began her work in Botany 1 with Dr. Steckbeck and was confused and awkward with the microscope. At the end of her first week in the class, Dr. Steckbeck's assistant came to him and said: " Miss X is not doing much microscope work."

Dr. Steckbeck said: " Let her alone. She'll come around."

Miss X was let alone until she went to Dr. Steckbeck and said: " Will you explain the microscope to me; it is beyond my comprehension."

Dr. Steckbeck promptly explained to her in such a clear, comprehensive way that she no longer had any difficulty, and became a fair microscopic student. She was so interested in Botany that she continued to take courses—Botany II under Boeshore, Botany 31-T, Philadelphia Flora and Vicinity and Plant Geography under Dr. Fogg, and finally Plant Anatomy under Dr. Steckbeck. The latter was a difficult course mostly for graduate and Pre-med students. Much of it is microscopic work. She worried through the course until almost time for examinations, and then she was so discouraged that she went to Dr. Steckbeck and said:

" I know I am going to flunk this course, so I am not going to take the examination. There is no need worrying you with the reading of a paper that is bound to fail."

Dr. Steckbeck smiled and replied: " You are going to take this examination. You have done more conscientious work in this class than in any other you have taken."

She took the examination and passed it, and as a result of this experience continued her work in College Collateral courses and eventually graduated.

This instance is characteristic of Dr. Steckbeck. He never let his students down. Story after story is told of his assistance to students to whom he was affectionately known as " Stecky " during his forty-four years of teaching botany at the University of Pennsylvania.

He was a truly dedicated teacher. His chief ambition in life was to give to his students the maximum of kindly, helpful teaching. And where would the Botanical Society of Pennsylvania have been had it not been for Dr. Steckbeck? For many years he was the conscientious, self-sacrificing Secretary, and later President of that Society. He knew every member from the time it was founded until the day of his death, and could recall their names. My last meeting with him was at the home of the President, Irwin Boeshore, in May, 1954, when at a meeting of the Council we were planning the trips and program of the year. Every name that was mentioned at the meeting, Dr. Steckbeck could recall; he could tell exactly who each person was and relate some homey little incident to illustrate his memory.

He was loved not only by the students of Botany 1, but especially by those who were taking Pre-Med and Vet courses. Having given up his own ambition to be a medical doctor, he dedicated his life to assisting his students, not only in class work but in preparation for life.

His talk about poisonous plants at one of our meetings was one of botanical lectures which remains clearly in my memory. Many a time in MacFarlane Hall I have nodded in the darkness while the pictures were being shown and the speaker was telling his story, but never when Dr. Steckbeck was on the platform did I have the slightest desire to go to sleep.

My own introduction to Dr. Steckbeck was in the spring of 1920, at the open air theater of " Panhurst," estate of Mr. Robert Le Boutellier, Wayne, Pa., at a meeting of the Penna. Botanical Society. I had brought with me for identification a rare orchid, the Whorled Pogonia (now named *Isotria verticillata*). I was told to take it to a slim young man, with dark hair and eyes, who was the foremost taxonomist present. His dark eyes seemed to grow darker as he looked at me sternly and said:

" Oh, this you never should have picked! It is one of our rarest orchids." Then he demanded: " Where did you find it? "

Chagrined and embarrassed, for I was an ingenue in botanical lore, I admitted having found it on a hill above Martin's Dam, a popular swimming club for the Main Line of Philadelphia.

This incident influenced me to enroll as an auditor in Dr. Steckbeck's summer class in General Botany at the University of Penna. in 1924.

Dr. Steckbeck was born in Lebanon, Pa., where he received his public school education. There was no high school in the town, so he went directly from the grades to West Chester State Normal School, (now Teachers' College) where he was graduated with honors in 1905. He taught school for two years and was principal of the high school in Salina, Pa.

He entered the Medical School of the University of Pennsylvania in 1907. There he stayed only two weeks, for Dr. John MacFarlane, head of the Botanical

Department of the University influenced him to become a botanist rather than a medical doctor, and he began to teach as an assistant in the Dept. of Botany in 1909. His loyalty to Dr. MacFarlane never waned. One cannot think of Dr. Steckbeck without also thinking of Dr. John Muirhead MacFarlane.

General Botany, the Taxonomy of Flowering Plants, the Morphology of Plants, are some of the subjects Dr. Steckbeck taught. On Aug. 14, 1912 he was married to Maude McCallum, with whose devotion and helpfulness he was blessed until his death. After six years at the University, he specialized in poisonous plants, which subject he presented in the Veterinary School. He liked the Vets so much that he became almost as much interested in this school as in the Botany Department.

Dr. Steckbeck gave " Morphology of Plants " at the Arboretum of the Barnes Foundation where he was loved by everyone there. He enjoyed his teaching there so very much that he once told the Director, Laura L. Barnes, that he would be happy to teach for free.

No one person served the Botanical Society of Pennsylvania so long and so faithfully as Dr. Steckbeck. At times he carried on in several capacities at once: President, Vice President, Secretary, Treasurer and also a member of the Council. In any place where he was needed he cheerfully pitched in. Always, he was willing to work.

Until Dr. Steckbeck died on October 14, 1956, he lived in Narberth, Penna., where he was a member of the Presbyterian Church. He was a member of the Order of Masons and served on the Board of Education.

At a memorial meeting which was held in MacFarlane Hall for Dr. Steckbeck on January 5, 1957, Dr. Roland Holroyd, Prof. of Botany at La Salle College, emphasized that Dr. Steckbeck was a friend of all his students; a " botanist's botanist," a teacher in all that the term connotates, and a loyal and devoted " Pennsylvanian." And Mrs. Arthur Iliff read a beautiful poem entitled:

Walter

"Say that he sleeps, for there is none to wake him;
Say that he smiles, he has no cause to grieve;
Say that he triumphs, for the testament
He died for, men still cherish and believe.

"Say that he is remembered, since his likeness
Is written clear on hearts that loved him best;
Say that he is at peace, where Earth has given
Shelter and solace from the world's unrest."

Philadelphia Botanical Club Records

Program of Meetings

Date	*Subject*	*Speaker*	*Attendance*
1957			
Jan. 24	Roadside Impressions—Canada to Florida	John Gill	39
Feb. 28	My 1956 Trip to Central America	Theodor P. Haas	31
Mar. 28	Roving New England's Forests	C. Earle Smith, Jr.	33
Apr. 25	A Naturalist in the Indiana State Parks	William R. Overlease	29
May 23	A Botanist in South Africa	Walter Hodge	27
Sept. 26	Report by Members on Summer Experiences		28
Oct. 24	A Short Botanical Tour of the U. S.	Ralph M. Sargent	30
Nov. 21	A Botanist in Southern Mexico	John M. Fogg, Jr.	46
Dec. 19	Rare and Lost Plants of our Region	Edgar T. Wherry	46
1958			
Jan. 23	Over the Andes by Jeep	Mrs. J. Norman Henry	71
Feb. 27	Dividends from the Fungal World	Dr. Patricia Allison	31
	Mushrooms in Color: Photos by Norman Fisher and R. James Foster		
Mar. 27	The Tinicum Wildlife Preserve	George Lamb	34
Apr. 24	Climbing into Spring	Mrs. John M. Huebner	44
May 22	A Short Botanical Excursion	C. Earle Smith, Jr.	30
Sept. 25	Report by Members on Summer Experiences		16
Oct. 23	My Trip to South America 1958	Theodor P. Haas	40
Nov. 20	Four Seasons in the Alps	Paul B. Green	43
Dec. 18	Native Plants Worth Cultivating	Edgar T. Wherry	43

Officers and Members, 1957–1958

Mrs. J. Norman Henry, *President*
Hugh E. Stone, *Vice President*
Walter M. Benner, *Secretary*
Harry W. Trudell, *Treasurer*
Bayard Long, *Curator*
Edgar T. Wherry, *Editor*

ACTIVE MEMBERS (as of October 1, 1959)

	Elected
Mrs. C. J. Allen, Jr., Woodside Lane, Riverton, N. J.	1957
Mrs. Sadie Ashendorf, 5014 Erringer Place, Philadelphia 44, Pa.	1954
Mrs. F. E. Atkins, 3422 Queen Lane, Philadelphia 29, Pa.	1953
Mrs. A. C. Barnes, Box 128, Merion Station, Pa.	1942
Edwin B. Bartram, Bushkill, Pa.	1906
Dr. Walter M. Benner, 5636 Loretta Ave., Philadelphia 24, Pa.	1912
Dr. David Berkheimer, Limekiln, Berks Co., Pa.	1943
Carl E. Bliss, Chagrin Road, R.D. 1, Chagrin Falls, Ohio	1924
Miss Ethel Brubaker, Beech Dale, Bird in Hand, Pa.	1939
William C. Brumbach, Esterly, Pa.	1943
Miss Margaret Butler, 4598 Castor Ave., Philadelphia 24, Pa.	1953
Dr. William W. Cadbury, 274 W. Main St., Moorestown, N. J.	1950
Richard B. Chillas, 233 Winona Ave., Philadelphia 44, Pa.	1942
John W. Coburn, 120 Nippon St., Philadelphia 19, Pa.	1951
Miss Carola S. Collings, 1728 Pine St., Philadelphia 3, Pa.	1954

W. L. Dix, 801 Crown St., Morrisville, Pa.	1942
Mrs. Paul Domville, 311 Hilldale Road, Villanova, Pa.	1956
Albert Donaghy, Jr., 203 E. Wellens St., Philadelphia 20, Pa.	1952
Robert R. Dreisbach, 301 Helen St., Midland, Mich.	1922
Miss Elizabeth C. Earle, 4209 Chester Ave., Philadelphia 4, Pa.	1935
Mrs. Nellie Erisman, 508 S. 41st St., Philadelphia 4, Pa.	1945
Mrs. Harold Evans, Awbury, E. Washington Lane, Philadelphia 38, Pa.	1931
Mrs. W. Brooks Evert, 430 Thomas Ave., Riverton, N. J.	1957
Carl W. Fenninger, 8304 Stenton Ave., Philadelphia 18, Pa.	1947
Miss Elizabeth H. Flavell, 245 Sumac St., Philadelphia 28, Pa.	1946
Sister M. Flaventia, Holy Family College, Torresdale, Philadelphia 14, Pa.	1958
Dr. John M. Fogg, Jr., 6807 Quincy St., Philadelphia 19, Pa.	1921
Adrian Ford, 10 Wilde Ave., Drexel Hill, Pa.	1959
Mrs. Adrian Ford, 10 Wilde Ave., Drexel Hill, Pa.	1959
William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa.	1956
Mrs. William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa.	1956
Fairman R. Furness, Media, Pa.	1935
Mrs. John F. Gall, 128 Fairview Road, Penn Valley, Narberth, Pa.	1959
John Gill, 2 Linden Ave., Haddonfield, N. J.	1939
Dr. Thomas S. Githens, Cambridge Apts., Philadelphia 44, Pa.	1945
Dr. Robert B. Gordon, 415 Sharpless St., West Chester, Pa.	1942
Dr. Theodor P. Haas, 514 S. 44th St., Philadelphia 4, Pa.	1946
Louis E. Hand, Box 46, New Lisbon, N. J.	1936
Miss Ann Harbison, The Barclay, 18th & Rittenhouse Sq., Philadelphia 3, Pa.	1944
Mrs. J. Norman Henry, Gladwyne, Pa.	1932
J. Norman Henry, Jr., Mulberry Lane, Haverford, Pa.	1956
Miss Josephine de N. Henry, Gladwyne, Pa.	1938
A. H. Holcombe, Jr., 1330 Youngs Ford Road, Gladwyne, Pa.	1949
Mrs. A. H. Holcombe, Jr., 1330 Youngs Ford Road, Gladwyne, Pa.	1949
Mrs. John M. Huebner, 150 Anton Road, Wynnewood, Pa.	1958
Miss Nancy E. James, 4043 Baltimore Ave., Philadelphia 4, Pa.	1942
Prof. M. A. Johnson, Dept. of Botany, Rutgers University, New Brunswick, N. J.	1946
Mrs. M. L. Kendig, 65 S. Main St., Manheim, Pa.	1935
Robert L. Kendig, 75 Street Road, Southampton, Pa.	1955
Miss Natalie B. Kimber, 538 E. Locust Ave., Philadelphia 44, Pa.	1928
Ludwig A. Koelnau, 2038 Race St., Philadelphia 3, Pa.	1952
George Lamb, 905 W. Mt. Airy Ave., Philadelphia 19, Pa.	1958
Mrs. Ida K. Langman, 3509 Baring St., Philadelphia 4, Pa.	1937
Miss Emma Leatherman, Fairfax Apts., 43rd & Locust St., Philadelphia 4, Pa.	1957
Miss Elizabeth H. Lewis, 400 S. 45th St., Philadelphia 4, Pa.	1954
Dr. Hui-Lin Li, Morris Arboretum, Philadelphia 18, Pa.	1944
Dr. Harry A. Lloyd, 200 N. 35th St., Philadelphia 4, Pa.	1931
Bayard Long, 250 Ashbourne Road, Elkins Park, Philadelphia 17, Pa.	1906
Mrs. C. P. Mann, Cherry Lane, Riverton, N. J.	1957
William G. McEwing, 1343 S. Lindenwood St., Philadelphia 43, Pa.	1955
Dr. Edwin T. Moul, Dept. of Botany, Rutgers University, New Brunswick, N. J.	1945
George F. Nicklas, 82 Evanson Ave., Clementon, N. J.	1951
Dr. Frederick M. Oldach, 323 Wellesley Road, Philadelphia 19, Pa.	1951
Mrs. George B. Orr, Willow Brook Farm, Paoli, Pa.	1935
Miss Elizabeth G. Ostheimer, Jenkintown, Pa.	1933
Dr. Samuel C. Palmer, Chipmunk Lane, Media, Pa.	1929
Walter Palmer, Route 16, Media, Pa.	1952
Mrs. Frank Parker, 400 S. 45th St., Philadelphia 4, Pa.	1950

Dr. Ruth Patrick, P. O. Box 4095, Chestnut Hill Sta., Philadelphia 18, Pa.	1937
Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
Dr. Charles W. Reimer, 2341 Cedar Lane, Secane, Pa.	1953
Dr. Cecilia Riegel, 1002 Aiken Road, Philadelphia 31, Pa	1957
Dr. Robert Robbins, Temple University, Dept. of Radiology, Philadelphia 40, Pa.	1954
Frank Robinson, 871 Preston Street, Philadelphia 4, Pa.	1957
Mrs. Philip Q. Roche, Harts Lane, Miquon, Pa.	1953
Miss Anne Rowland, Meadowbrook, Pa.	1948
Mrs. Karl Rugart, 612 Bryn Mawr Ave., Penn Valley, Narberth, Pa.	1942
Dr. Ralph M. Sargent, 4 College Circle, Haverford, Pa.	1948
Dr. Robert L. Schaeffer, Jr., 30 N. 8th St., Allentown, Pa.	1938
Miss Dorothy Scott, 2539 E. Cumberland St., Philadelphia 25, Pa.	1959
Miss D. M. Shoemaker, 884 N. 25th St., Philadelphia 30, Pa.	1957
Dr. Robert V. Speck, 737 Cedar Ave., Haddonfield, N. J.	1947
Mrs. Robert V. Speck, 737 Cedar Ave., Haddonfield, N. J.	1947
Dr. C. I. Stiteler, 507 Welsh Street, Chester, Pa.	1945
Hugh E. Stone, White Hall Apts., Haverford, Pa.	1892
Miss Mary Sullivan, Montgomery Court L23, Narberth, Pa.	1954
Mrs. Howard W. Taylor, 139 Booth Lane, Haverford, Pa.	1952
Miss Elizabeth Thorp, 403 S. 41st St., Philadelphia, Pa.	1953
Robert J. Titherington, 6317 N. Norwood St., Philadelphia 38, Pa.	1942
Harry W. Trudell, 1309 Highland Ave., Abington, Pa.	1915
Dr. Elizabeth A. Valentine, P.O. Box 186, Furlong, Pa.	1949
Mrs. J. H. Vance, 148 Montgomery Ave., Bala-Cynwyd, Pa.	1950
Charles Van Housen, 5022 Erringer Place, Philadelphia 44, Pa.	1954
Miss Hilda Vilkomerson, Cucumber Hill Road, Foster Center, R. I.	1955
Mrs. Jesse T. Vogdes, N. Lemon St., Media, Pa.	1958
Dr. Paul R. Wagner, 789 Main St., Collegeville, Pa.	1935
E. Perot Walker, 3009 Park Road, Lafayette Hills, Pa.	1939
Mrs. E. Perot Walker, 3009 Park Road, Lafayette Hills, Pa.	1958
Albert J. Webb, 351 Oak Terrace, Wayne, Pa.	1959
Miss Hilda Weber, 1020 Earl St., Philadelphia 25, Pa.	1950
Dr. Lily A. Weierbach, 5220 Wayne Ave., Philadelphia 44, Pa.	1958
Dr. Edgar T. Wherry, 228 Harvey St., Philadelphia 44, Pa.	1925
Stanley D. Wikoff, Dept. of Education, Longwood Gardens, Kennett Square, Pa.	1958
Hans Wilkens, 424 S. 15th St., Reading, Pa.	1928
Miss Elizabeth Wistar, 200 Montgomery Ave., Philadelphia 18, Pa.	1952
William H. Witte, R. D., Riegelsville, Pa.	1898
James Woodford, Cedar Run Lake, Medford, N. J.	1959
Mrs. James Woodford, Cedar Run Lake, Medford, N. J.	1959
Miss Mary F. Wright, 231 Winona Ave., Philadelphia 44, Pa.	1928
Mrs. H. Winfield Wright, 515 Folcroft Ave., Folcroft, Pa.	1959

CORRESPONDING MEMBERS

Dr. Harold St. John, Chatham College, Pittsburgh 32, Pa.	1927
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich.	1921
Dr. Heber W. Youngken, Massachusetts College of Pharmacy, Boston, Mass	1918

RECENTLY DECEASED MEMBERS

James McClurken	March 6, 1958
James R. McIntosh	July 17, 1958
Miss Elizabeth A. Gest	April 25, 1959
Addison Kern	1959

No. 30 1959-60

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

CONTENTS

A Preliminary Catalogue of the Flora of Lebanon County, Pennsylvania
CARL S. KEENER 1

Philadelphia Botanical Club Records 15

PUBLISHED BY THE CLUB
ACADEMY OF NATURAL SCIENCES, NINETEENTH AND THE PARKWAY
PHILADELPHIA 3, PENNSYLVANIA
Subscription Price, $1.00. Back Numbers, $1.00 each.
ISSUED JANUARY 13, 1961

MISSOURI BOTANICAL
GARDEN LIBRARY

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

No. 30 1959–60

A Preliminary Catalogue of the Flora of Lebanon County, Pennsylvania *

CARL S. KEENER

The objective of this thesis is to present a review of the current status of the vascular flora of Lebanon County, in the southeastern portion of Pennsylvania. This county, shaped roughly like a trapezoid, has an area of 363 square miles and is bounded on the east by Berks and Schuylkill counties, on the west and north by Dauphin, and on the south by Lancaster County. It lies between 76° 8′ and 76° 41′ west, and between 40° 11′ and 40° 33′ north.

Topography and Geology.—The Piedmont province extends a short distance into the southern part of the county; it is here underlain by rocks of Triassic age, comprising soft red shale, hard sandstone and conglomerate, and intrusive diabase. These more resistant rocks stand up in ridges 1000 to 1200 feet high. At the extreme southeastern corner there is a small area of the Northeast Highland (Blue Ridge) province, made up of pre-Cambrian intrusive rocks and Cambrian quartzite, forming ridges around 1300 to 1400 feet in height.

Most of the county lies in the Ridge-and-Valley province, occupied by sedimentary rocks of Paleozoic age, with minor igneous intrusions around Jonestown. From south to north the bands of these rocks, trending from west-southwest to east-northeast, comprise: The Lebanon or southern division of the Great Valley, underlain by Cambrian and Ordovician limestones, 450–640 feet above sea level; the northern division of the Great Valley, Ordovician (Martinsburg) shales, up to 150 feet higher; Blue (also called First or Kittatinny) Mountain, Silurian quartzite, rising abruptly to around 1500 feet; Trout Run valley, Upper Silurian and Devonian formations; Second Mountain, Mississippian (Pocono) sandstone, a narrow but continuous ridge up to 1300–1400 feet; Stony Creek valley, showing outcrops of Mississippian (Mauch Chunk) shale, mostly red but locally brownish or greenish; Sharp Mountain, Pennsylvanian (Pottsville) quartzitic sandstone and conglomerate, another similar ridge attaining 1500 feet; a narrow valley underlain by coal-bearing Pennsylvanian strata, in which there was formerly some strip-mining; and finally Stony Mountain, a second outcrop of the Pottsville formation, rising to 1640 feet, the highest altitude in Lebanon County.

---

* A condensation of a Thesis in Botany, presented to the Faculty of the Graduate School of the University of Pennsylvania in partial fulfillment of the requirements for the degree of Master of Science, 1960. The full thesis, with extensive data here omitted, can be consulted in the Library of the University of Pennsylvania.

The major stream in Lebanon county is Swatara Creek, with its tributaries the Little Swatara, the Quittapahilla, and minor ones. This enters the county near the northeast corner, turns south, cutting the prominent Swatara Gap through Blue Mountain, and meanders southward and westward, leaving the county at the middle of its western boundary. Several lesser creeks rise in the county, but soon cross its borders in various directions. Toward the west end of Blue Mountain lies Indiantown Gap, now traversed only by a small stream.

Climate.—The average rainfall is about 43 inches, the southwestern corner receiving somewhat less and the northeastern more. The annual temperature range is around – 10° to 95°, with extremes recorded near the southwest corner of – 14° and 102° F. Killing frosts occur into early May and mid-October, the average length of the growing season being 163 days. The climate is thus to be classed as mild-temperate.

Previous Botanical Work.—Porter's Flora of Pennsylvania (1903) lists only 92 species as occurring in the county (14 without known herbarium record); he collected as early as 1865. A. A. Heller and J. K. Small were there at intervals from about 1890 to 1900, and their specimens are distributed in many herbaria. The chief collectors from 1900 to 1915 were C. A. Arndt, Witmer Stone and E. B. Ulrich; and during the subsequent 40 years, David Berkheimer, Flora Fender, E. T. Moul, R. W. Pohl, H. W. Pretz, W. S. Sargent, Mrs. L. F. A. Tanger, H. A. Ward, E. T. Wherry, and Hans Wilkens. Lesser numbers of specimens have been noted in herbaria as collected by some 25 additional botanists. The writer has made extensive collections in many parts of the county in the course of preparation of this thesis; a grant from the Jessup Fund of the Academy of Natural Sciences of Philadelphia helped support this field work, and is hereby gratefully acknowledged. Thanks are also due to Dr. John M. Fogg, Jr., who supervised this work, and Dr. Edgar T. Wherry of the University of Pennsylvania as well as Dr. H. A. Wahl of Pennsylvania State University, for aid in identification of specimens and solving taxonomic problems.

Features of the Flora.—The total number of taxa (species, varieties, forms and hybrids) recorded for the county in the card index of Pennsylvania plants at the University of Pennsylvania is 1040. Although Lebanon County has no virgin forests remaining, there are numerous wooded areas, especially in the far-southern and the northern upland regions. Because of the many different kinds of underlying rock formations, there are moreover many sorts of open land habitats. The county consequently supports a rather rich flora.

Lebanon County lies wholly south of the Glacial border, the nearest point where Jerseyan drift is known being 15 miles, Wisconsin drift 40 miles, to the north. If as some authorities hold, a broad strip of tundra developed south of the ice sheets during each advance, the forests of this area may have been greatly altered, if not totally destroyed. The present vegetation then may represent a development of the past ten or twelve thousand years. It is of interest in this connection to consider the taxa which now reach geographic limits within or near the county.

A. Northern taxa reaching a local southern limit.

Scirpus pedicellatus
Corallorhiza trifida var. *verna*
Alnus rugosa
Vaccinium myrtilloides

B. Southern taxa reaching a local northern limit.

Salix caroliniana
Liatris spicata var. *resinosa*

C. Taxa best developed on the Atlantic Coastal Plain

Agrostis hyemalis
Myrica pensylvanica
Magnolia virginiana
Lechea racemulosa
Stachys hyssopifolia
Eupatorium pilosum

D. Taxa best developed in the midland states.

Carex mesochorea
Carex molesta
Aesculus octandra
Vaccinium stamineum var. *interius*
Verbena canadensis
Helianthus giganteus

E. Taxa especially local or rare in Pennsylvania.

Scirpus subterminalis
Carex granularis var. *haleana*
Wolffia punctata
Xyris caroliniana
Juncus gymnocarpus
Paronychia fastigiata var. *nuttalli*
Silene antirrhina forma *deaneana*
Arabis laevigata var. *burkii*
Crataegus boyntoni
Menziesia pilosa
Asclepias variegata
Ipomoea lacunosa
Cuscuta compacta
Stachys hyssopifolia
Pycnanthemum clinopodioides
Chelone glabra forma *tomentosa*
Galium palustre
Color-forms of:
  Gaylussacia baccata
  Sabatia angularis
  Gentiana crinita
  Mimulus ringens
  Dipsacus sylvestris
  (the last undescribed)

(F. Acid-soil taxa, chiefly on sandstone or shale formations, numerous.)

(G. Limy-soil taxa, a few.)

(H. A list of 245 taxa not known to have been collected in Lebanon County, but occurring near its borders and so to be expected here is given in the thesis.)

Check List of the Vascular Flora *

The card index of the Flora of Pennsylvania at the Herbarium of the University of Pennsylvania was used to compile this list; all specimens in this herbarium, and most of those in that of the Academy of Natural Sciences of Philadelphia, were also checked. The nomenclature and sequence of taxa follow M. L. Fernald in Gray's Manual of Botany, ed. 8 (1950), with the exception of the genus *Chenopodium,* for which H. A. Wahl's treatment published in Bartonia No. 27, 1954, is adopted.

Plants have been collected in Lebanon County at or near the following places; the first list is of points readily found on maps, the second of more or less obscure places which appear on occasional herbarium labels, with their approximate locations.

Collecting Sites, List 1.—Annville, Bellegrove, Buffalo Springs, Campbelltown, Cleona, Cold Spring, Colebrook, Cornwall, East Hanover, Ebenezer, Fontana, Fredericksburg, Greble, Green Point, Indiantown Gap, Inwood, Jonestown, Kleinfeltersville, Lawn, Lebanon, Lickdale, Millbach, Mt. Gretna, Mt. Zion, Myerstown, Newmanstown, Palmyra, Penryn (park or station), Quentin, Richland, Schaefferstown, Sheridan, Swatara Gap, Twin Grove Park, and Upper Lawn.

Collecting Sites, List 2.—

Avon: 3 miles east-northeast of Lebanon.
Bunker Hill: 1¼ miles southwest of Jonestown.
Cocalico: in Lancaster Co., 2½ miles southeast of Kleinfeltersville.
Coleman's Memorial Park: northwest part of Lebanon city.
Gold Mine: 1¾ miles northwest of Twin Grove Park.
Governor Dick hill (mt.): east of Mt. Gretna.
Hammer Cr. at Co. line: 3¾ miles southwest of Schaefferstown.
Harper Tavern: 1 mile east-northeast of East Hanover.
Hill Church: 1½ miles south-southeast of Colebrook.
"Hulls Tavern and Cornwall roads", apparently near Quentin.
Lake Conewago: at Mt. Gretna.
Lebanon Valley College: at Annville.
Lover's Leap: a cliff just southwest of Annville.
Miners village: southeast end of Cornwall.
Mt. Pleasant: 1½ miles west of Fontana.
Ono: 2½ miles north-northeast of Bellegrove.
Rausch Gap: 2¾ miles northwest of Green Point.
Steelstown: 1¾ miles southwest of Bellegrove.
St. Joseph Springs: 1¾ miles west-northwest of Indiantown Gap.
[Suedberg: in Schuylkill Co., mistakenly attributed to Lebanon.]
Swatara Junction: 1 mile southwest of Jonestown.

---

* In the original thesis the localities where each taxon is known to have been collected are all listed; in the present condensation such data are given only for unique records.

In the systematic list which follows, the numerals in parentheses following the name of each taxon represent the number of localities at which it is known to have been collected. The sources of naturalized taxa are indicated by abbreviations in brackets.

EQUISETACEAE: *Equisetum arvense* (6); *E. a.* v. *ramulosum* (2); *E. sylvaticum* f. *multiramosum* (3); *E. hyemale* v. *affine* (3).

LYCOPODIACEAE: *Lycopodium lucidulum* (6); *L. clavatum* (2); *L. obscurum* (3); *L. o.* v. *dendroideum* (1, Cold Spring); *L. complanatum* v. *flabelliforme* (5).

SELAGINELLACEAE: *Selaginella apoda* (2).

ISOETACEAE: *Isoetes engelmanni* (4).

OPHIOGLOSSACEAE: *Botrychium dissectum* (3); *B. d.* f. *obliquum* (4); *B. matricariaefolium* (2); *B. virginianum* (6). *Ophioglossum vulgatum* v. *pseupodum* (1, Mt. Gretna).

OSMUNDACEAE: *Osmunda regalis* v. *spectabilis* (3); *O. claytoniana* (2); *O. cinnamomea* (4).

POLYPODIACEAE: *Woodsia ilvensis* (1, Bellegrove); *W. obtusa* (3). *Cystopteris fragilis* v. *mackayi* (3). *Onoclea sensibilis* (3). *Dryopteris thelypteris* v. *pubescens* (2); *D. noveboracensis* (3); *D. hexagonoptera* (5); *D. spinulosa* (5); *D. s.* v. *intermedia* (7); *D. intermedia* × *spinulosa* = *D.* × *triploidea* [not in Gray] (1, Newmanstown); *D. cristata* × *intermedia* = *D.* × *boottii* (2); *D. cristata* (3); *D. marginalis* (6); *D. m.* f. *elegans* (1, Newmanstown). *Polystichum acrostichoides* (6). *Dennstaedtia punctilobula* (5). *Athyrium thelypterioides* (3); *A. filix-femina* v. *michauxii* f. *rubellum* (2); *A. f.* v. *asplenioides* (2). *Camptosorus rhizophyllus* (5). *Asplenium cryptolepis* (3); *A. trichomanes* (3); *A. platyneuron* (8); *A. platyneuron* × *Camptosorus rhizophyllus* = *A.* × *ebenoides* (1, Campbelltown). *Pellaea atropurpurea* (5). *Adiantum pedatum* (2). *Pteridium aquilinum* v. *latiusculum* (7). *Polypodium virginianum* (7).

TAXACEAE: *Taxus canadensis* (1, Jonestown).

PINACEAE: *Tsuga canadensis* (4). *Pinus strobus* (4); *P. virginiana* (5); *P. rigida* (3); *P. pungens* (2). *Juniperus communis* v. *depressa* (3); *J. virginiana* v. *crebra* (3).

TYPHACEAE: *Typha latifolia* f. *ambigua* (1, Ebenezer).

SPARGANIACEAE: *Sparganium eurycarpum* (1, Bellegrove); *S. americanum* (3).

NAJADACEAE: *Najas flexilis* (1, Ebenezer).

ALISMATACEAE: *Alisma subcordatum* (5). *Sagittaria rigida* (1, Jonestown); *S. australis* (2); *S. latifolia* v. *pubescens* (1, Cleona).

HYDROCHARITACEAE: *Elodea canadensis* (4).

GRAMINEAE: *Bromus japonicus* v. *porrectus* [Eu.] (3); *B. commutatus* [Eu.] (6); *B. sterilis* [Eu.] (1, Lebanon); *B. tectorum* [Eu.] (2). *Festuca elatior* [Eu.] (5); *F. obtusa* (3). *Vulpia octoflora* v. *tenella* (2). *Glyceria septentrionalis* (3); *G. melicaria* (2); *G. striata* (7). *Poa annua* [Euras.] (4); *P. compressa* [Euras.] (5); *P. pratensis* [Eu.] (4); *P. trivialis* (6). *Dactylis glomerata* [Eu.] (6). *Eragrostis megastachya* [Eu.] (3); *E. poaeoides* [Eu.] (1, Jonestown); *E. pectinacea* (3); *E. capillaris* (1, W. Lebanon). *Triodia flava* f. *cuprea* (4). *Agropyron repens* [Eu.] (4). *Lolium perenne* [Eu.] (2); *L. multiflorum* [Eu.] (1, Lebanon). *Hordeum jubatum* (1, Mt. Gretna); *H. vulgare* [Eu.] (1, Quentin). *Triticum aestivum* [Euras.] (1, Quentin). *Elymus virginicus* (1, Jonestown); *E. riparius* (3); *E. villosus* (1, Palmyra, nw). *Hystrix patula* (3). *Arrhenatherum elatius* [Eu.] (4). *Holcus lanatus* [Eu.] (3). *Sphenopholis nitida* (3); *S. intermedia* (8). *Danthonia spicata* (6). *Sporobolus vaginiflorus* (3). *Calamagrostis cinnoides* (3). *Agrostis alba* [Euras.] (6); *A. hyemalis* (1, Kleinfeltersville); *A. perennans* (4). *Cinna arundinacea* (2). *Phleum pratense* [Eu.] (4). *Muhlenbergia schreberi* (5); *M. sobolifera* (2); *M. sylvatica* (3); *M. frondosa* (2). *Aristida dichotoma* (3). *Eleusine indica* [Euras.] (2). *Phalaris arundinacea* (3). *Anthoxanthum odoratum* [Eu.] (6). *Leersia virginica* (2); *L. oryzoides* (2). *Digitaria filiformis* (1, Inwood); *D. ischaemum* [Eu.] (3); *D. sanguinalis* [Euras.] (4). *Paspalum laeve* v. *circulare* (2); *P. ciliatifolium* v. *muhlenbergii* (1, Penryn). *Panicum dichotomiflorum* (2); *P. capillare* (1, Jonestown); *P. philadelphicum* (3); *P. gattingeri* (3); *P. anceps* (2); *P. agrostoides* (1, Ebenezer); *P. depauperatum* v. *psilophyllum* (4); *P. linearifolium* (1, Cleona); *P. dichotomum* (4); *P. meridionale* (1, St. Joseph Springs); *P. lanuginosum* v. *fasciculatum* (3); *P. columbianum* (1, St. Joseph Springs); *P. oligosanthes* v. *scribnerianum* (1, Mt. Gretna); *P. commutatum* v. *ashei* (1, Green Point); *P. clandestinum* (6). *Echinochloa crusgalli* [Euras.] (5); *E. pungens* (2). *Setaria glauca* [Euras.] (5); *S. viridis* [Euras.] (3); *S. faberi* [As.] (6). *Andropogon scoparius* (3); *A. gerardi* (1, Sheridan); *A. virginicus* (2). *Sorghastrum nutans* (2).

CYPERACEAE: *Cyperus flavescens* v. *poaeformis* (2); *C. rivularis* (3); *C. esculentus* (6); *C. strigosus* (10); *C. filiculmis* (2); *C. f.* v. *macilentus* (1, Jonestown). *Dulichium arundinaceum* (2). *Eleocharis acicularis* (3); *E. engelmannii* (1, Indiantown Gap); *E. obtusa* (8); *E. calva* (2); *E. tenuis* (8); *E. t.* v. *pseudoptera* (1, Ebenezer). *Bulbostylis capillaris* v. *crebra* (4). *Scirpus verecundus* (3); *S. purshianus* (1, Cornwall); *S. subterminalis* (1, Cold Spring); *S. validus* v. *creber* (1, Bellegrove); *S. atrovirens* (6); *S. a.* v. *georgianus* (8); *S. polyphyllus* (6); *S. lineatus* (1, Jonestown); *S. cyperinus* (5); *S. pedicellatus* (1, Cornwall). *Eriophorum virginicum* (1, Colebrook). *Carex convoluta* (5); *C. rosea* (8); *C. cephalophora* (9); *C. mesochorea* (1, Colebrook); *C. spicata* [Euras.] (1, Cornwall); *C. muhlenbergii* v. *enervis* (2); *C. aggregata* (3); *C. sparganioides* (4); *C. vulpinoidea* (8); *C. annectens* (4); *C. a.* v. *xanthocarpa* (4); *C. conjuncta* (1, Cleona); *C. stipata* (5); *C. laevivaginata* (6); *C. bromoides* (1, Annville); *C. incomperta* (4); *C. angustior* (2); *C. scoparia* (8); *C. tribuloides* (4); *C. cristatella* (4); *C. normalis* (7); *C. festucacea* (4); *C. molesta* (4); *C. argyrantha* (1, Green Point); *C. leptalea* (4); *C. willdenowii* (5); *C. pensylvanica* (3); *C. communis* (2); *C. emmonsii* (1, Twin Grove Park); *C. artitecta* (4); *C. nigromarginata* (1, Kleinfeltersville); *C. umbellata* (3); *C. abdita* (3); *C. tonsa* (2); *C. hirtifolia* (3); *C. crinita* (1, Bellegrove); *C. c.* v. *gynandra* (5); *C. stricta* (2); *C. scabrata* (1, Schaefferstown); *C. hirsutella* (9); *C. caroliniana* (1, Indiantown Gap); *C. bushii* (2); *C. virescens* (1, Mt. Zion); *C. swanii* (6); *C. prasina* (3);

C. gracillima (4); *C. debilis* v. *rudgei* (3); *C. granularis* (5); *C. g.* v. *haleana* (1, Myerstown); *C. conoidea* (1, Annville); *C. amphibola* v. *rigida* (5); *C. a.* v. *turgida* (3); *C. flaccosperma* v. *glaucodea* (5); *C. platyphylla* (1, Kleinfeltersville); *C. digitalis* (7); *C. laxiculmis* (3); *C. laxiflora* (5); *C. blanda* (5); *C. gracilescens* (1, Jonestown); *C. styloflexa* (1, Kleinfeltersville); *C. frankii* (3); *C. squarrosa* (5); *C. hystricina* (3); *C. lurida* (9); *C. folliculata* (5); *C. intumescens* (4); *C. lupulina* (3).

ARACEAE: *Arisaema atrorubens* (2); *A. triphyllum* [*pusillum*] (1, Cornwall); *A. stewardsonii* (2); *A. dracontium* (1, Jonestown). *Symplocarpus foetidus* (4). *Acorus calamus* (2).

LEMNACEAE: *Spirodela polyrrhiza* (1, Bellegrove). *Lemna minor* (2). *Wolffia punctata* (1, Bellegrove).

XYRIDACEAE: *Xyris torta* (1, Mt. Gretna); *X. caroliniana* (1, Mt. Gretna).

COMMELINACEAE: *Commelina communis* [As.] (1, Bellegrove); *C. c.* v. *ludens* [As.] (2).

PONTEDERIACEAE: *Heteranthera dubia* (1, Jonestown).

JUNCACEAE: *Juncus secundus* (1, Cleona); *J. tenuis* (4); *J. t.* v. *anthelatus* (1, Ebenezer); *J. dudleyi* (1, Jonestown); *J. gymnocarpus* (1, Rausch Gap, type collection, Porter, 1866); *J. effusus* v. *pylaei* (1, Fredericksburg); *J. e.* v. *solutus* (2); *J. marginatus* (1, Ebenezer); *J. subcaudatus* (2); *J. acuminatus* (6). *Luzula multiflora* (3); *L. echinata* (2).

LILIACEAE: *Chamaelirium luteum* (3). *Amianthium muscaetoxicum* (1, Penryn). *Melanthium hybridum* (3). *Veratrum viride* (4). *Uvularia perfoliata* (3); *U. sessilifolia* (3). *Allium canadense* (3); *A. vineale* [Eu.] (3); *A. tricoccum* (1, Jonestown). *Hemerocallis fulva* [Euras.] (2). *Lilium philadelphicum* (2); *L. superbum* (4). *Erythronium americanum* (5). *Ornithogalum umbellatum* [Eu.] (4). *Asparagus officinalis* [Eu.] (2). *Smilacina racemosa* (2); *S. r.* v. *cylindrata* (5). *Maianthemum canadense* (3). *Polygonatum pubescens* (4); *P. biflorum* (3); *P. canaliculatum* (2). *Medeola virginiana* (2). *Trillium cernuum* (2); *T. undulatum* (1, Cold Spring). *Aletris farinosa* (1, Mt. Gretna). *Smilax herbacea* (4); *S. rotundifolia* (4); *S. tamnoides* v. *hispida* (1, Jonestown); *S. glauca* v. *leurophylla* (3).

DIOSCOREACEAE: *Dioscorea villosa* (3).

AMARYLLIDACEAE: *Hypoxis hirsuta* (4).

IRIDACEAE: *Belamcanda chinensis* [As.] (1, Mt. Gretna). *Sisyrinchium mucronatum* (2); *S. angustifolium* (2). *Iris versicolor* (3); *I. flavescens* [cultivar] (1, Lebanon).

ORCHIDACEAE: *Cypripedium calceolus* v. *pubescens* (1, Cornwall); *C. acaule* (2). *Orchis spectabilis* (1, Annville). *Habenaria clavellata* (4); *H. flava* v. *herbiola* (1, Ebenezer); *H. orbiculata* (1, Schaefferstown, sw); *H. ciliaris* (3); *H. lacera* (3); *H. fimbriata* (1, Mt. Gretna). *Isotria verticillata* (2). *Calopogon pulchellus* (1, Mt. Gretna). *Spiranthes gracilis* (1, Mt. Gretna); *S. cernua* (3). *Goodyera pubescens* (4). *Corallorhiza trifida* v. *verna* (1, Cornwall); *C. maculata* (1, Mt. Gretna); *C. odontorhiza* (1, Mt. Gretna). *Malaxis unifolia* (1, Mt. Gretna). *Liparis liliifolia* (2).

SALICACEAE: *Salix caroliniana* (1, Ebenezer); *S. rigida* (1, Bellegrove); *S. humilis* (4); *S. h.* v. *rigidiuscula* (1, Mt. Gretna); *S. sericea* (1, Bellegrove); *S. purpurea* [Eu.] (2). *Populus tremuloides* (2); *P. grandidentata* (8); *P. nigra* [Eu.] (1, W. Lebanon).

MYRICACEAE: *Myrica pensylvanica* (1, Cold Spring). *Comptonia peregrina* (1, Green Point).

JUGLANDACEAE: *Juglans cinerea* (2); *J. nigra* (3). *Carya ovata* (1, Jonestown); *C. tomentosa* (1, Campbelltown); *C. glabra* (1, Twin Grove Park).

CORYLACEAE: *Corylus americana* (4). *Carpinus caroliniana* v. *virginica* (3). *Betula lenta* (5); *B. lutea* (2); *B. nigra* (3). *Alnus rugosa* (1, Millbach); *A. serrulata* (7).

FAGACEAE: *Fagus grandifolia* (3). *Castanea dentata* (3). *Quercus alba* (4); *Q. stellata* (2); *Q. bicolor* (1, Mt. Gretna); *Q. prinoides* (2); *Q. prinus* (2); *Q. rubra* (2); *Q. palustris* (2); *Q. velutina* (2); *Q. ilicifolia* (4).

ULMACEAE: *Ulmus rubra* (2); *U. americana* (3). *Celtis occidentalis* (3).

MORACEAE: *Morus alba* [As.] (2). *Maclura pomifera* (2).

URTICACEAE: *Urtica procera* (1, Myerstown). *Laportea canadensis* (1, Bellegrove). *Pilea pumila* (4). *Boehmeria cylindrica* (2). *Parietaria pensylvanica* (1, Cleona).

SANTALACEAE: *Comandra umbellata* (3).

ARISTOLOCHIACEAE: *Asarum canadense* (2). *Aristolochia serpentaria* (2).

POLYGONACEAE: *Rumex crispus* [Eu.] (4); *R. obtusifolius* [Eu.] (3); *R. acetosella* [Eu.] (3). *Polygonum aviculare* [Eu.] (3); *P. a.* v. *vegetum* [Eu.] (1, Sheridan); *P. tenue* (4); *P. pensylvanicum* v. *laevigatum* (4); *P. lapathifolium* (1, W. Lebanon); *P. hydropiper* (3); *P. persicaria* [Eu.] (4); *P. punctatum* v. *leptostachyum* [*confertiflorum*] (2); *P. hydropiperoides* (1, Bellegrove); *P. sagittatum* (5); *P. arifolium* v. *pubescens* (3); *P. cilinode* (1, Cold Spring); *P. convolvulus* [Eu.] (2); *P. cristatum* (1, Inwood); *P. scandens* (5); *P. sachalinense* [As.] (1, Mt. Gretna).

CHENOPODIACEAE: *Chenopodium botrys* [Euras.] (4); *C. ambrosioides* [Trop. Amer.] (2); *C. standleyanum* (2); *C. album* [Eu.] (3); *C. a.* v. *lanceolatum* [Eu.] (2); *C. missouriense* (1, Buffalo Springs); C. *bushianum* [Eu.] (3). *Atriplex patula* v. *hastata* (2). *Salsola kali* v. *tenuifolia* [Euras.] (1, Cornwall).

AMARANTHACEAE: *Amaranthus hybridus* [Trop. Amer.] (5); *A. retroflexus* [Trop. Amer.] (4); *A. albus* (3).

NYCTAGINACEAE: *Mirabilis nyctaginea* (3).

PHYTOLACCACEAE: *Phytolacca americana* (6).

ARIZOACEAE: *Mollugo verticillata* [Trop. Amer.] (2).

PORTULACACEAE: *Portulaca oleracea* [Eu.] (1, Mt. Gretna). *Claytonia virginica* (6).

CARYOPHYLLACEAE: *Paronychia canadensis* (3); *P. fastigiata* (3); *P. f.* v. *nuttalli* (1, Mt. Gretna); *P. f.* v. *pumila* (2). *Spergularia rubra* [Eu.] (1, Mt. Gretna). *Arenaria serpyllifolia* [Eu.] (6). *Stellaria media* [Eu.] (7); *S. graminea* [Eu.] (1, Myerstown); *S. longifolia* (4); *S. alsine* (1, St. Joseph Springs).

Cerastium vulgatum [Eu.] (4); *C. nutans* (2). *Agrostemma githago* [Eu.] (1, Annville); *Lychnis alba* [Euras.] (2); *L. flos-cuculi* [Eu.] (1, Mt. Gretna). *Silene cucubalus* [Euras.] (2); *S. stellata* (1, Annville); *S. antirrhina* (3); *S. a.* f. *deaneana* (1, Cleona); *S. caroliniana* v. *pensylvanica* (2). *Saponaria officinalis* [Eu.] (3). *Dianthus armeria* [Eu.] (3); *D. barbatus* [Eu.] (1, Cornwall).

CERATOPHYLLACEAE: *Ceratophyllum demersum* (1, Bellegrove).

NYMPHAEACEAE: *Nuphar advena* (1, Bellegrove).

RANUNCULACEAE: *Ranunculus trichophyllus* (1, Millbach); *R. ambigens* (2); *R. sceleratus* (2); *R. abortivus* (6); *R. recurvatus* (4); *R. hispidus* v. *falsus* (3); *R. septentrionalis* (5); *R. repens* [Eu.] (2); *R. acris* [Eu.] (2); *R. bulbosus* [Eu.] (1, Annville). *Thalictrum dioicum* (3); *T. revolutum* (1, Penryn); *T. polygamum* (4). *Anemonella thalictroides* (7). *Hepatica americana* (7). *Anemone virginiana* (4); *A. quinquefolia* (3). *Clematis virginiana* (4); *C. verticillaris* (2). *Caltha palustris* (5); *C. p.* v. *flabellifolia* [not in Gray] (1, Miners Village). *Coptis groenlandica* (4). *Aquilegia canadensis* (3). *Cimicifuga racemosa* (2). *Actaea pachypoda* (2).

BERBERIDACEAE: *Podophyllum peltatum* (3). *Caulophyllum thalictroides* (1, Jonestown). *Berberis vulgaris* [Eu.] (1, Cornwall); *B. thunbergii* [As.] (2).

MENISPERMACEAE: *Menispermum canadense* (2).

MAGNOLIACEAE: *Magnolia virginiana* (2). *Liriodendron tulipifera* (5).

ANNONACEAE: *Asimina triloba* (2).

LAURACEAE: *Sassafras albidum* (2); *S. a.* v. *molle* (5). *Lindera benzoin* (8).

PAPAVERACEAE: *Sanguinaria canadensis* (5). *Chelidonium majus* [Eu.] (4). *Adlumia fungosa* (1, Mt. Gretna). *Dicentra cucullaria* (2). *Corydalis sempervirens* (2).

[CAPPARIDACEAE: *Polanisia graveolens* (1, Mt. Gretna; discovered since thesis was completed)].

CRUCIFERAE: *Draba verna* [Eu.] (1, Lawn). *Alyssum alyssoides* [Eu.] (2). *Thlaspi arvense* [Eu.] (3). *Lepidium campestre* [Eu.] (3); *L. virginicum* (2); *L. densiflorum* [Eu.] (1, W. Lebanon). *Capsella bursa-pastoris* [Eu.] (3). *Camelina microcarpa* [Eu.] (3). *Raphanus sativus* [Eu.] (1, Jonestown). *Brassica kaber* v. *pinnatifida* [Euras.] (3); *B. nigra* [Euras.] (1, W. Lebanon). *Sisymbrium officinale* v. *leiocarpum* [Euras.] (1, Bellegrove); *S. altissimum* [Eu.] (2). *Arabidopsis thaliana* [Eu.] (3). *Hesperis matronalis* [Eu.] (1, Jonestown). *Erysimum cheiranthoides* [Euras.] (2). *Rorippa islandica* v. *fernaldiana* (4). *Nasturtium officinale* [Eu.] (4). *Armoracia lapathifolia* [Eu.] (1, Myerstown). *Barbarea vulgaris* [Eu.] (3); *B. v.* v. *arcuata* [Eu.] (3); *B. verna* [Eu.] (1, Jonestown). *Dentaria laciniata* (1, Kleinfeltersville). *Cardamine bulbosa* (3); *C. rotundifolia* (1, Jonestown); *C. pensylvanica* (3); *C. parviflora* v. *arenicola* (1, Ebenezer). *Arabis lyrata* (3); *A. laevigata* (1, Cleona); *A. l.* v. *burkii* (1, Annville); *A. canadensis* (4).

DROSERACEAE: *Drosera rotundifolia* (2).

CRASSULACEAE: *Sedum sarmentosum* [As.] (3); *S. ternatum* (2); *S. purpureum* [Euras.] (1, Jonestown).

SAXIFRAGACEAE: *Penthorum sedoides* (5). *Saxifraga virginiensis* (4); *S. pensylvanica* (3). *Tiarella cordifolia* (1, Mt. Gretna). *Heuchera americana* (2). *Mitella diphylla* (4). *Chrysosplenium americanum* (3). *Ribes rotundifolium* (1, Millbach); *R. hirtellum* (1, Miners Village); *R. sativum* [Eu.] (2); *R. americanum* (1, Annville).

HAMAMELIDACEAE: *Hamamelis virginiana* (6).

PLATANACEAE: *Platanus occidentalis* (2).

ROSACEAE: *Physocarpus opulifolius* (3). *Spiraea alba* (1, Jonestown). *Gillenia trifoliata* (1, Mt. Gretna). *Pyrus coronaria* (2); *P. floribunda* (1, Penryn); *P. melanocarpa* (2). *Amelanchier arborea* (1, Jonestown). *Crataegus boyntoni* (1, Penryn); others are listed by Porter, but lack supporting specimens. *Fragaria virginiana* (3); *F.* × *ananassa* [cultivar] (1, Annville). *Duchesnea indica* [As.] (2). *Waldsteinia fragarioides* (1, Penryn). *Potentilla recta* [Eu.] (1, Annville); *P. norvegica* (4); *P. canadensis* (1, Annville); *P. simplex* (4). *Geum canadense* (3); *G. virginianum* (1, Colebrook); *G. laciniatum* v. *trichocarpum* (1, Jonestown); *G. aleppicum* v. *strictum* (2); *G. vernum* (1, Jonestown). *Rubus phoenicolasius* [As.] (2); *R. idaeus* v. *strigosus* (1, Mt. Gretna); *R. occidentalis* (1, Jonestown); *R. flagellaris* (1, Myerstown); *R. roribaccus* (1, Jonestown); *R. hispidus* (1, Mt. Gretna); many more are undoubtedly present but have not been collected. *Agrimonia gryposepala* (2); *A. parviflora* (1, Bellegrove); *A. pubescens* (3). *Sanguisorba canadensis* (2). *Rosa multiflora* [As.] (1, Jonestown); *R. eglanteria* [Eu.] (1, Annville); *R. palustris* (1, Jonestown); *R. carolina* (1, Cornwall). *Prunus americana* (1, Annville); *P. serotina* (6).

LEGUMINOSAE: *Gleditsia triacanthos* (2). *Cassia hebecarpa* (3); *C. nictitans* (4). *Baptisia tinctoria* (4). *Crotalaria sagittalis* (2). *Lupinus perennis* (1, Penryn). *Trifolium arvense* [Eu.] (2); *T. pratense* [Eu.] (2); *T. repens* [Eu.] (4); *T. hybridum* v. *elegans* [Eu.] (3); *T. agrarium* [Eu.] (2); *T. procumbens* [Eu.] (3). *Melilotus officinalis* [Eu.] (2); *M. alba* [Eu.] (1, Annville). *Medicago sativa* [Eu.] (1, Annville); *M. lupulina* [Eu.] (5). *Lotus corniculatus* [Eu.] (1, Sheridan). *Robinia pseudo-acacia* (4). *Coronilla varia* [Eu.] (1, Bellegrove). *Desmodium nudiflorum* (3); *D. rotundifolium* (2); *D. ciliare* (1, Penryn); *D. canadense* (1, Mt. Gretna); *D. cuspidatum* (1, Cold Spring); *D. paniculatum* (4); *D. perplexum* (2). *Lespedeza procumbens* (1, Inwood); *L. repens* (2); *L. intermedia* (2); *L. capitata* (1, Twin Grove Park). *Vicia tetrasperma* [Eu.] (1, Mt. Gretna); *V. dasycarpa* [Eu.] (1, Annville); *V. americana* (1, Jonestown). *Lathyrus latifolius* [Eu.] (1, Annville). *Apios americana* (1, Mt. Gretna). *Amphicarpa bracteata* (1, Swatara Gap); *A. b.* v. *comosa* (1, Ebenezer).

LINACEAE: *Linum medium* v. *texanum* (2); *L. virginianum* (2); *L. striatum* (3).

OXALIDACEAE: *Oxalis violacea* (1, Richland); *O. stricta* (3); *O. filipes* (3); *O. europaea* (6).

GERANIACEAE: *Geranium maculatum* (4); *G. columbinum* [Eu.] (1, Mt. Gretna); *G. carolinianum* (1, Palmyra); *G. robertianum* (1, Kleinfeltersville).

RUTACEAE: *Xanthoxylum americanum* (1, Annville).

SIMAROUBACEAE: *Ailanthus altissima* [As.] (2).

POLYGALACEAE: *Polygala paucifolia* (3); [*P. senega,* 1, Colebrook; discovered since thesis was completed]; *P. sanguinea* (2); *P. verticillata* v. *isocycla* (1, Mt. Gretna); *P. v.* v. *ambigua* (2).

EUPHORBIACEAE: *Acalypha rhomboidea* (6); *A. virginica* (6); *A. gracilens* (1, Inwood). *Euphorbia corollata* (1, Mt. Gretna); *E. supina* (4); *E. maculata* (5); *E. vermiculata* (3).

CALLITRICHACEAE: *Callitriche heterophylla* (1, Fredericksburg).

LIMNANTHACEAE: *Floerkea proserpinacoides* (1, Kleinfeltersville).

ANACARDIACEAE: *Rhus typhina* (2); *R. glabra* (3); *R. copallina* v. *latifolia* (2); *R. vernix* (1, Mt. Gretna); *R. radicans* (2).

AQUIFOLIACEAE: *Ilex opaca* (1, Cold Spring); *I. montana* (1, Cold Spring); *I. verticillata* (4).

CELASTRACEAE: [*Euonymus americanus* " Suedberg ", Co. uncertain.] *Celastrus scandens* (3).

STAPHYLACEAE: *Staphylea trifolia* (2).

ACERACEAE: *Acer spicatum* (1, Newmanstown); *A. pensylvanicum* (2); *A. platanoides* [Eu.] (2); *A. rubrum* (7); *A. saccharinum* (1, Lebanon); *A. negundo* (2).

HIPPOCASTANACEAE: *Aesculus octandra* (1, Annville).

BALSAMINACEAE: *Impatiens pallida* (1, Kleinfeltersville); *I. capensis* [*biflora*] (3).

RHAMNACEAE: *Ceanothus americanus* (1, Mt. Gretna).

VITACEAE: *Parthenocissus quinquefolia* (4). *Vitis labrusca* (3); *V. aestivalis* (3); *V. a.* v. *argentifolia* (1, Green Point); *V. riparia* (2); *V. vulpina* (2).

MALVACEAE: *Malva neglecta* (2). *Abutilon theophrasti* [As.] (3). *Hibiscus trionum* [Eu.] (3).

GUTTIFERAE: *Hypericum perforatum* [Eu.] (3); *H. punctatum* (3); *H. mutilum* (4); *H. gentianoides* (2).

CISTACEAE: *Helianthemum canadense* (1, Mt. Gretna). *Lechea racemulosa* (1, Mt. Gretna); *L. leggettii* (1, Jonestown).

VIOLACEAE: *Viola pedata* (2); *V. p.* v. *lineariloba* (3); *V. cucullata* (2); *V. papilionacea,* status not established; *V. affinis* (2); *V. sororia* (2); *V. hirsutula* (2); *V. fimbriatula* (5); *V. sagittata* (3); *V. triloba* (2); *V. palmata* (1, Annville); *V. stoneana* (1, Jonestown); *V. blanda* (2); *V. primulifolia* (2); *V. rotundifolia* (1, Millbach); *V. pubescens* (1, Kleinfeltersville); *V. pensylvanica* (4); *V. striata* (3); *V. conspersa* (7); *V. arvensis* [Eu.] (1, Myerstown).

LYTHRACEAE: *Lythrum salicaria* [Eu.] (2). *Cuphea petiolata* (3).

NYSSACEAE: *Nyssa sylvatica* (2).

MELASTOMATACEAE: *Rhexia virginica* (2).

ONAGRACEAE: *Ludwigia alternifolia* (4); *L. palustris* v. *americana* (1, Bellegrove). *Epilobium angustifolium* (2); *E. leptophyllum* (1, Mt. Gretna); *E.*

coloratum (2). *Oenothera tetragona* v. *longistipata* (2). *Gaura biennis* (2). *Circaea quadrisulcata* v. *canadensis* (5); *C. alpina* (2).

ARALIACEAE: *Aralia racemosa* (2); *A. hispida* (2); *A. nudicaulis* (3). *Panax quinquefolius* (1, Mt. Gretna); *P. trifolius* (2).

UMBELLIFERAE: *Hydrocotyle americana* (2). *Sanicula marilandica* (1, Penryn); *S. canadensis* (3). *Osmorhiza claytoni* (5); *O. longistylis* (1, Kleinfeltersville); *O. l.* v. *villicaulis* (2). *Zizia aptera* (2). *Cicuta maculata* (1, Jonestown). *Cryptotaenia canadensis* (4). *Carum carvi* [Eu.] (1, Penryn). *Taenidia integerrima* (3). *Pimpinella saxifraga* [Eu.] (1, Mt. Gretna). *Thaspium barbinode* (2). *Angelica venenosa* (2); *A. atropurpurea* (1, Annville). *Pastinaca sativa* [Eu.] (3). *Daucus carota* [Eu.] (7).

CORNACEAE: *Cornus florida* (7); *C. amomum* (6); *C. racemosa* (4); *C. alternifolia* (3).

PYROLACEAE: *Chimaphila umbellata* v. *cisatlantica* (3); *C. maculata* (6). *Pyrola elliptica* (3); *P. rotundifolia* v. *americana* (2). *Monotropa uniflora* (4); *M. hypopithys* (1, Mt. Gretna).

ERICACEAE: *Rhododendron maximum* (1, Green Point), *R. nudiflorum* (5); *R. n.* f. *glandiferum* (1, Myerstown); *R. viscosum* (2); *R. v.* f. *glaucum* (1, Penryn). *Menziesia pilosa* (1, Cold Spring); *Kalmia latifolia* (6). *Lyonia ligustrina* (2). *Epigaea repens* (9). *Gaultheria procumbens* (7). *Gaylussacia frondosa* (3); *G. baccata* (4); *G. b.* f. *leucocarpa* (1, Mt. Gretna). *Vaccinium stamineum* (4); *V. s.* v. *interius* (1, Green Point); *V. s.* v. *neglectum* (1, Kleinfeltersville); *V. myrtilloides* (1, Schaefferstown); *V. vacillans* (3); *V. v.* v. *crinitum* (2); *V. angustifolium* v. *laevifolium* (1, Kleinfeltersville); *V. atrococcum* (2); *V. macrocarpon* (1, Mt. Gretna).

PRIMULACEAE: *Lysimachia terrestris* (1, Annville); *L. nummularia* [Eu.] (1, Jonestown); *L. ciliata* (5). *Trientalis borealis* (3). *Anagallis arvensis* [Eu.] (2).

OLEACEAE: *Fraxinus americana* (1, Jonestown); *F. a.* v. *biltmoreana* (1, Jonestown); *F. nigra* (1, Jonestown). *Ligustrum obtusifolium* [As.] (1, Newmanstown).

GENTIANACEAE: *Sabatia angularis* (1, Mt. Gretna); *S. a.* f. *albiflora* (1, Mt. Gretna). *Centaurium pulchellum* [Eu.] (3). *Gentiana crinita* (3); *G. c.* f. *albina* (1, Penryn); *G. andrewsii* (6); *G. clausa* (2); *G. villosa* (1, Penryn). *Bartonia virginica* (3); *B. paniculata* (2). *Obolaria virginica* (2).

APOCYNACEAE: *Vinca minor* [Eu.] (1, Campbelltown). *Apocynum androsaemifolium* (1, Penryn); *A. medium* (1, Mt. Gretna); *A. cannabinum* (3); *A. c.* v. *glaberrimum* [not in Gray] (1, Ebenezer); *A. c.* v. *pubescens* (1, Cornwall).

ASCLEPIADACEAE: *Asclepias tuberosa* (4); *A. incarnata* (4); *A. quadrifolia* (2); *A. exaltata* (3); *A. variegata* (1, Mt. Gretna); *A. syriaca* (3); *A. amplexicaulis* (2).

CONVOLVULACEAE: *Ipomoea pandurata* (2); *I. lacunosa* (1, Jonestown). *Convolvulus spithamaeus* (1, Jonestown); *C. sepium* (2); *C. arvensis* [Euras.] (1, W. Lebanon). *Cuscuta gronovii* (3); *C. compacta* (1, Penryn).

POLEMONIACEAE: *Phlox divaricata* (2); *P. maculata* (1, Jonestown); *P. paniculata* (2).

HYDROPHYLLACEAE: *Hydrophyllum virginianum* (2).

BORAGINACEAE: *Echium vulgare* [Eu.] (2). *Lithospermum arvense* [Eu.] (7). *Cynoglossum officinale* [Eu.] (3). *Myosotis scorpioides* [Eu.] (2); *M. laxa* (3); *M. verna* (1, Cleona). *Mertensia virginica* (1, Jonestown). *Hackelia virginiana* (4).

VERBENACEAE: *Verbena urticifolia* (4); *V. u.* v. *leiocarpa* (1, Millbach); *V. hastata* (4); *V. simplex* (1, Cleona); *V. canadensis* (1, Schaefferstown).

LABIATAE: *Trichostema dichotomum* (2). *Teucrium canadense* v. *virginicum* (4). *Scutellaria elliptica* (3); *S. integrifolia* (1, Mt. Gretna); *S. lateriflora* (4). *Agastache nepetoides* (1, Schaefferstown). *Nepeta cataria* [Eu.] (3). *Glechoma hederacea* [Eu.] (4). *Dracocephalum parviflorum* [Mid-U.S.] (1, Myerstown). *Prunella vulgaris* v. *lanceolata* (4). *Leonurus cardiaca* [Eu.] (1, Cleona). *Lamium amplexicaule* [Eu.] (4). *Stachys palustris* (1, Sheridan); *S. hyssopifolia* (1, Cornwall). *Salvia lyrata* (2). *Monarda clinopodia* (1, Bellegrove). *Hedeoma pulegioides* (2). *Satureja vulgaris* v. *neogaea* (4). *Pycnanthemum tenuifolium* (2); *P. virginianum* (2); *P. clinopodioides* (1, Swatara Gap); *P. incanum* (2). *Origanum vulgare* [Eu.] (1, Lebanon, n.). *Thymus serpyllum* [Eu.] (1, Mt. Gretna). *Cunila origanoides* (2). *Lycopus uniflorus* (3); *L. americanus* (7). *Mentha alopecuroides* [Eu.] (3); *M. rotundifolia* [Eu.] (1, Cleona); *M. spicata* [Eu.] (2); *M. piperita* [Eu.] (4); *M. arvensis* f. *glabra* (1, Mt. Gretna). *Collinsonia canadensis* (3). *Perilla frutescens* [As.] (1, Jonestown).

SOLANACEAE: *Solanum dulcamara* [Eu.] (3); *S. americanum* (1, Jonestown); *S. carolinense* (2). *Physalis subglabrata* (2); *P. heterophylla* v. *ambigua* (1, Annville); *P. alkekengi* [As.] (1, Bellegrove). *Datura stramonium* [As.] (2). *Nicotiana longiflora* [Trop. Amer.] (1, Mt. Zion).

SCROPHULARIACEAE: *Verbascum thapsus* [Eu.] (2); *V. lychnitis* [Eu.] (1, Mt. Gretna); *V. blattaria* [Eu.] (4). *Linaria vulgaris* [Eu.] (3). *Chaenorrhinum minus* [Eu.] (2). *Scrophularia lanceolata* (2); *S. marilandica* (3). *Chelone glabra* (2); *C. g.* f. *tomentosa* (1, Kleinfeltersville). *Penstemon digitalis* (1, Jonestown). *Mimulus ringens* (6); *M. r.* f. *peckii* (1, Harper Tavern). *Gratiola neglecta* (2). *Lindernia dubia* (2). *Veronicastrum virginicum* (1, Penryn). *Veronica serpyllifolia* [Eu.] (2); *V. officinalis* (6); *V. scutellata* (2); *V. americana* (1, Annville); *V. peregrina* (2); *V. arvensis* [Eu.] (3); *V. polita* [Eu.] (1, Annville); *V. hederaefolia* [Eu.] (1, Jonestown). *Gerardia tenuifolia* (1, E. Hanover); *G. virginica* (2). *Castilleja coccinea* (1, Newmanstown). *Melampyrum lineare* (3). *Pedicularis canadensis* (5).

BIGNONIACEAE: *Catalpa bignonioides* [S. U. S.] (2).

OROBANCHACEAE: *Orobanche uniflora* (3).

ACANTHACEAE: *Justicia americana* (2).

PHRYMACEAE: *Phryma leptostachya* (3).

PLANTAGINACEAE: *Plantago major* [Eu.] (2); *P. rugelii* (6); *P. lanceolata* [Eu.] (4); *P. aristata* (2); *P. virginica* (2).

RUBIACEAE: *Galium aparine* (5); *G. triflorum* (4); *G. pilosum* (2); *G. circaezans* (2); *G. c.* v. *hypomalacum* (1, Mt. Gretna); *G. lanceolatum* (3); *G. mollugo* [Eu.] (2); *G. palustre* (2); *G. obtusum* (1, Mt. Gretna); *G. asprellum* (1, Jonestown). *Mitchella repens* (8). *Cephalanthus occidentalis* (4). *Houstonia coerulea* (4); *H. longifolia* (1, Mt. Gretna).

CAPRIFOLIACEAE: *Diervilla lonicera* (4). *Lonicera morrowi* [Euras.] (1, W. Lebanon); *L. japonica* (1, W. Lebanon); *L. dioica* (2). *Symphoricarpos albus* v. *laevigatus* [W. U. S.] (1, Mt. Gretna); *S. orbiculatus* (1, Mt. Gretna). *Triosteum perfoliatum* (1, Mt. Gretna); *T. aurantiacum* (1, Mt. Gretna); *T. a.* v. *glaucescens* (1, Penryn). *Viburnum cassinoides* (1, Cold Spring); *V. prunifolium* (5); *V. recognitum* (2); *V. acerifolium* (5). *Sambucus canadensis* (1, Jonestown); *S. pubens* (1, Newmanstown).

VALERIANACEAE: *Valerianella olitoria* [Eu.] (3); *V. patellaria* (2); *V. intermedia* (3).

DIPSACACEAE: *Dipsacus sylvestris* [Eu.] (3); *D. s.*, white flowered form, undescribed (1, Greble, w.).

CUCURBITACEAE: *Sicyos angulatus* (2). *Echinocystis lobata* (3).

CAMPANULACEAE: *Specularia perfoliata* (3). *Campanula americana* (1, Jonestown); *C. aparinoides* (2). *Lobelia cardinalis* (5); *L. siphilitica* (6); *L. spicata* (1, Jonestown); *L. inflata* (7).

COMPOSITAE: *Vernonia noveboracensis* (4). *Eupatorium fistulosum* (5); *E. purpureum* (2); *E. pilosum* (2); *E. sessilifolium* (2); *E. perfoliatum* (5); *E. rugosum* (5). *Liatris spicata* (1, Mt. Gretna); *L. s.* v. *resinosa* (1, Mt. Gretna). *Solidago caesia* (4); *S. flexicaulis* (1, Inwood); *S. bicolor* (6); *S. puberula* (2); *S. juncea* (5); *S. arguta* (1, Twin Grove Park); *S. patula* (1, Quentin); *S. nemoralis* (3); *S. odora* (1, Cold Spring); *S. ulmifolia* (2); *S. rugosa* (4); *S. r.* v. *aspera* (1, Lickdale); *S. canadensis* (1, Penryn); *S. c.* v. *hargeri* (1, Kleinfeltersville); *S. altissima* (3); *S. gigantea* (5); *S. graminifolia* v. *nuttallii* (5). *Aster divaricatus* (5); *A. macrophyllus* (2); *A. cordifolius* (2); *A. lowrieanus* (2); *A. undulatus* (3); *A. patens* (2); *A. p.* v. *phlogifolius* (1, Mt. Gretna); *A. novae-angliae* f. *roseus* (1, Quentin); *A. prenanthoides* (1, Jonestown); *A. puniceus* (3); *A. laevis* (6); *A. pilosus* (1, Jonestown); *A. p.* v. *demotus* (4); *A. dumosus* (1, Penryn); *A. lateriflorus* (4); *A. simplex* (4); *A. umbellatus* (2). *Erigeron pulchellus* (3); *E. philadelphicus* (4); *E. annuus* (2); *E. strigosus* (1, Mt. Gretna); *E. canadensis* (5). *Sericocarpus asteroides* (3). *Antennaria neglecta* (2); *A. neodioica* (7); *A. n.* v. *attenuata* (1, Jonestown); *A. fallax* (4); *A. plantaginifolia* (2); *A. p.* v. *petiolata* (1, Jonestown). *Anaphalis margaritacea* v. *intercedens* (1, Annville). *Gnaphalium obtusifolium* (3). *Ambrosia trifida* (1, W. Lebanon); *A. t.* f. *integrifolia* (1, Mt. Gretna); *A. artemisiifolia* (2). *Xanthium chinense* (1, Kleinfeltersville). *Heliopsis helianthoides* (4). *Eclipta alba* (1, Bellaire). *Rudbeckia laciniata* (3); *R. triloba* (2); *R. serotina* (4). *Helianthus decapetalus* (3); *H. tuberosus* (2); *H. giganteus* (2). *Actinomeris alternifolia* (1, Palmyra, 3½ m. n.). *Coreopsis lanceolata* [Mid. U. S.] (1, Cornwall). *Bidens cernua* (1, Ebenezer); *B. connata* v. *petiolata* (1, Ebenezer); *B. comosa*

(1, Ebenezer); *B. vulgata* (2); *B. frondosa* (2); *B. bipinnata* (3). *Galinsoga ciliata* [Trop. Amer.] (5). *Helenium autumnale* (1, Jonestown). *Achillea millefolium* (5); *A. m.* f. *rosea* (1, Cleona). *Anthemis arvensis* (Mt. Gretna). *Chrysanthemum leucanthemum* v. *pinnatifidum* (4). *Tanacetum vulgare* (1, Cold Spring). *Erechtites hieracifolia* (2). *Cacalia atriplicifolia* (3). *Senecio pauperculus* v. *balsamitae* (4); *S. aureus* v. *intercursus* (1, Kleinfeltersville); *S. a.* v. *gracilis* (3); *S. obovatus* (2). *Arctium minus* [Eu.] (3). *Cirsium vulgare* [Eu.] (1, Jonestown); *C. discolor* (1, Jonestown); *C. muticum* (1, Mt. Gretna); *C. pumilum* (1, Mt. Gretna); *C. arvense* [Eu.] (3). *Centaurea jacea* [Eu.] (1, Quentin); *C. nigra* v. *radiata* [Eu.] (2); *C. maculosa* [Eu.] (2). *Cichorium intybus* [Eu.] (4); *C. i.* f. *album* [Eu.] (1, Mt. Zion). *Krigia virginica* (2); *K. biflora* (1, Jonestown). *Hypochoeris radicata* [Eu.] (2). *Tragopogon porrifolius* [Eu.] (1, Annville); *T. pratensis* [Eu.] (2); *T. major* [Eu.] (1, Lickdale). *Taraxacum officinale* [Eu.] (5). *Sonchus uliginosus* [Eu.] (1, Ebenezer); *S. oleraceus* [Eu.] (1, Lebanon). *Lactuca scariola* [Eu.] (1, Jonestown); *L. canadensis* v. *longifolia* (2); *L. c.* v. *latifolia* (2); *L. biennis* (2). *Prenanthes alba* (3); *P. trifoliolata* (1, Green Point); *P. altissima* (3). *Hieracium flagellare* [Eu.] (1, Myerstown); *H. pratense* [Eu.] (3); *H. florentinum* [Eu.] (3); *H. venosum* (2); *H. paniculatum* (2); *H. scabrum* (4); *H. gronovii* (2).

Philadelphia Botanical Club Records, 1959

Date	*Subject*	*Speaker*	*Attendance*
1959			
Jan. 22	Flowers of the Pine Barrens	Mrs. C. J. Allen, Jr.	46
Feb. 26	Flowers of the Midnight Sun	Raymond D. Wood	65
Mar. 26	Botanical Studies in Mexico	Mrs. Ida K. Langman	31
Apr. 23	William Bartram—His Place in American Literature and Science	Dr. Francis Harper	55
May 28	Through the Season at the Morris Arboretum	Dr. John M. Fogg, Jr.	36
Sept. 24	Reports by Members on Summer Experiences		24
Oct. 22	Australian Scenes and Flowers	W. Keith Ashby	37
Nov. 19	Flowers of the Upper Mississippi Valley	Dr. Ralph M. Sargent	47
Dec. 17	One Hundred Wild Flower Photographs	Dr. Edgar T. Wherry	39

Mrs. J. Norman Henry, *President*
Hugh E. Stone, *Vice President*
Ralph M. Sargent, *Vice President*
Walter M. Benner, *Secretary*
Harry W. Trudell, *Treasurer*
Bayard Long, *Curator*
Edgar T. Wherry, *Editor*

Changes in Membership List from that in Bartonia No. 29 to Oct., 1960

NEW MEMBERS

	Elected
David Fables, 212 E. Second St., Roselle, N. J.	1960
John Gyer, Jessup Mill Road, Clarksville, N. J.	1959
John A. Lister, Sr., 5 College Circle, Haverford, Pa.	1960
Miss Mary O. Milton, Morris Arboretum, Philadelphia 18, Pa.	1960
Charles E. Mohr, 10 Beacon Hill Lane, Valley Forge, Pa.	1959
A. Edward Murray, Jr., 70 Kraft Lane, Kenwood, Levittown, Pa.	1960
Dr. Robert Robertson, 508 S. 41st St., Philadelphia 4, Pa.	1960
Mrs. Robert Robertson, 508 S. 41st St., Philadelphia 4, Pa.	1960
Mrs. George Stoops, Providence Road, Media, Pa.	1960
Mrs. W. B. Warden, 731 Yale Ave., Swarthmore, Pa.	1960

CHANGES OF ADDRESS

William C. Brumbach, 850 D. Berkshire Drive, Reading, Pa.	1943
Albert Donaghy, Jr., 6121 N. 16th St., Philadelphia 20, Pa.	1952
Miss Elizabeth C. Earle, 132 Carlton Place, Media, Pa.	1935
Miss Elizabeth H. Flavell, 6146 Wayne Ave., Philadelphia 44, Pa.	1946
Miss Dorothy Scott, 2359 E. Cumberland St., Philadelphia 25, Pa.	1959
Charles Van Housen, 202 S. 41st St., Philadelphia 4, Pa.	1954
James Woodford, Cedar Run Lake, Marlton, N. J.	1959
Mrs. James Woodford, Cedar Run Lake, Marlton, N. J.	1959

DECEASED

Miss Ethel Brubaker	Dec. 28, 1959
Dr. William W. Cadbury	Oct. 15, 1959
Miss Elizabeth G. Ostheimer	Feb. 14, 1960

Dr. William Warder Cadbury

Dr. William Warder Cadbury of Moorestown, New Jersey, passed away on his 82nd birthday, October 15, 1959. He studied at the William Penn Charter School, and was graduated from Haverford College in 1898. He then entered the University of Pennsylvania Medical School and received the M.D. degree in 1902. Going to China as a medical missionary, he helped found the medical school at Lingnan University, and held a professorship there. He practiced for some time at the Canton Hospital, becoming its Superintendent, but was forced to leave when the communists took over. Being especially interested in ferns, he assembled a herbarium of these not only from China but also other Pacific countries; this being classed as waste paper by the communist officials, he was allowed to take it with him, and in time presented it to the Academy of Natural Sciences here, serving as volunteer Curator of this group of plants. The Editor recalls with pleasure delightful discussions with him of his collecting experiences.

On returning to the Philadelphia region, Dr. Cadbury joined this Club, and was a faithful attendant of our meetings, even after failing health confined him to a wheel chair. He is survived by his wife, a brother and a sister, three daughters and 12 grandchildren.—E. T. W.

No. 31 **1960-61**

BARTONIA

JOURNAL OF THE PHILADELPHIA BOTANICAL CLUB

CONTENTS

David Fables, Naturalist and Educator .... E. T. Wherry 1

Caesarian Flora and Fauna .... Compiled by David Fables, Jr.

- Some New Jersey Plants of Northern Affinity 3
- 20 "Lost" Plants 7
- Some Field Records for the 1954 Season 10

Philadelphia Botanical Club Records, 1960

- Program of Meetings 12
- Officers and Members, 1960–1961 12
- Samuel C. Palmer 14

MISSOURI BOTANICAL
RECEIVED
JUN 4 1962
GARDEN LIBRARY

Published by the Club
Academy of Natural Sciences, Nineteenth and the Parkway
Philadelphia 3, Pennsylvania
Subscription Price, $1.00. Back Numbers, $1.00 each.
Issued May 15, 1962

Photo by Bogard

David George Fables, Jr., 1917–1961.

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

No. 31 1960–61

David Fables, Naturalist and Educator

With profound regret we record here the passing away on February 22, 1961, of David George Fables, Jr. He was born at Bayonne, New Jersey, May 24, 1917, and gained an early interest in nature through membership in the Boy Scouts. Graduating from Seton Hall University with a B.S. degree in Biology, he taught for a time in high schools, becoming in 1946 Instructor and in 1960 Associate Professor of Biology and head of the Biology Department at Union Junior College. In 1955 he married one of his students, Sue Chynoweth, who survives him. In a tribute to his memory by Saul Orkin, one of his colleagues, he is aptly characterized as "a great teacher, an imaginative scholar, a deft writer, a thoughtful speaker, a wise confidant, a good man."

Dave took a leading part in the activities of a number of natural history societies, being widely known among botanists as a leader of many field trips of the Torrey Botanical Club. He was much interested in relocating "lost" localities of rare plants, and not only succeeded in a number of such quests, but also discovered notable new localities. Disturbed by the encroachment of civilization on nature, he worked tirelessly to bring the need of conservation to wide attention, opposing such projects as turning the Great Swamp of northern, and the mid Pine Barrens of southern New Jersey into jet-airports.

Several years ago a group of amateurs joined in an informal organization known as the New Jersey Field Naturalists, and as a matter of course designated Dave as president. On behalf of this society he compiled and edited a series of brochures under the title **Caesarian Flora and Fauna.** These were published in small editions and did not receive wide circulation. It seems appropriate for Bartonia to republish No. 1, which has long been out of print; a few typographical errors are being corrected, and technical plant names placed in italics.—E. T. W.

CAESARIAN FLORA AND FAUNA

Number 1 **March 1956**

Compiled by David Fables, Jr., for the New Jersey Field Naturalists

Some New Jersey Plants of Northern Affinity

As other authors on plant distribution have noted, New Jersey for its size possesses a remarkably diversified flora. The State lies between the latitude of 38° 56′ and 41° 21′ N, an interval of 2° 25′. Its elevation ranges from sea level to 1804 feet at High Point in Sussex County. Considering these physical limitations, the State has a rather rich northern flora. The terminal moraine of the Wisconsin glacial period follows an irregular line through the northern part of the State, in such manner that all of Passaic, Bergen, Hudson, and Essex Counties lie north of the moraine, and practically all of Sussex County. In addition, the northern half of Warren County, the northeastern part of Morris County, and the eastern part of Union and Middlesex Counties were subjected to glacial action. The remaining counties or parts thereof lie south of the moraine and are poorly represented by northern plants.

Expansion of industry and cities has destroyed most of the former stations for rare and interesting plant species in Hudson, Essex and Union Counties. Apparently in recent years there has been little botanical field work in Bergen or Hunterdon Counties. Therefore it is Sussex, Warren, Passaic and Morris that are the "Northern counties" referred to in the following list of plants.

It is equally remarkable that in such a densely populated state as New Jersey, with its constant industrial expansion, and reduction of forested areas, that many species are not extinct. This disheartening appellation need be applied to relatively few of the species ever recorded in the State.

Much of the diversity in the flora is due to the variety of geological formations found within its boundaries. There exist limestone, shale, slate, sandstone, conglomerate and others. The ridges, nowhere reaching two thousand feet, contain depressions that have developed swamp, muskeg, and bog associations. It is in the woodlands of the Kittatinny Mountains and the Highlands that most of the plants of northern affinity are to be found.

In the list of plants selected will be noted some species that are found south of New Jersey, but at much higher elevations in the Southern Appalachians. Species which occur on the Coastal Plain south of New Jersey have been omitted. Those listed all have their centers of distribution to the north of the State.

1. Bog Club-moss (*Lycopodium inundatum*)—still found at several localities in the northern counties. A healthy colony exists at Lake Wapalanne, and another in Swenson Fields, Stokes Forest, though recent dry seasons have resulted in a sizable shrinkage in the extent of the latter.

2. Bristly Club-moss (*Lycopodium annotinum*)—rare, confined to Wawayanda Plateau, Sussex County, and the vicinity of Green Pond Brook, Morris County.

3. Black Spruce (*Picea mariana*)—found in the muskegs and swamps of the northern counties.

4. Hare's Tail (*Eriophorum spissum*)—occurs locally in the bogs and muskegs of the northern counties.

5. Slender Cotton-grass (*Eriophorum gracile*)—local; found in bogs of the northern counties. There is an old record for Repaupo Bog, Gloucester County.

6. Delicate Cotton-grass (*Eriophorum tenellum*)—in Pine Barren bogs. Found at Quaker Bridge in July, 1954.

7. Green-keeled Cotton-grass (*Eriophorum viridi-carinatum*)—occurs locally in swamps of the northern counties. There is a station near Mountain Lake, Warren County.

8. Northern Jack-in-the-pulpit (*Arisaema Stewardsonii*)—occurs at numerous stations in the swamps and moist woodlands of the northern counties.

9. Wild Calla (*Calla palustris*)—well-distributed in swamps of the northern counties, south to the Great Swamp of Morris County.

10. Mountain Yellow-eyed-grass (*Xyris montana*)—a local species of muskegs in Sussex County. There is a colony at Mashipacong Pine Swamp.

11. Yellow Bead-lily (*Clintonia borealis*)—well-distributed in moist, shaded woods of the northern counties, south to the Great Swamp of Morris County.

12. Three-leaved Solomon's Seal (*Smilacina trifolia*)—occurs at a number of stations in swamps of the northern counties.

13. Rosy Twisted-stalk (*Streptopus roseus*)—known from at least two localities. In addition to the one listed by Britton in his "Catalogue," Sparta Glen, Sussex County, 1887, it has been found on the Plateau near Wawayanda Lake.

14. Red Trillium (*Trillium erectum*)—found at a number of stations in rich, shaded woods of the northern counties.

15. Painted Trillium (*Trillium undulatum*)—found at a number of stations in woods and swamps of the northern counties.

16. Small Yellow Lady's-slipper (*Cypripedium parviflorum*)—found in swamps, chiefly calcareous, in Sussex and Warren Counties.

17. Showy Lady's-slipper (*Cypripedium reginae*)—still persists at a half-dozen or more stations, most of which are sufficiently off the beaten path of the collector of horticulturally important species to give hope for continued survival. The stations are largely in the limestone region of Sussex and Warren Counties.

18. Hooker's Orchis (*Habenaria Hookeri*)—occurs at a number of stations in the woods of the northern counties.

19. Round-leaved Orchis (*Habenaria orbiculata*)—one of the rarest plants in the State. Several former localities have been destroyed, and a small colony located at the base of Kittatinny Mountain in Sussex County is now the only known station.

20. Large Purple Fringed Orchis (*Habenaria fimbriata*)—many stations have been destroyed, but it occurs at a number of localities in the relatively unspoiled swamps of the northern counties.

21. Small Purple Fringed Orchis (*Habenaria psycodes*)—well-distributed in the northern swamps, especially along stream beds.

22. Dwarf Rattlesnake-plantain (*Goodyera repens*)—a small colony was found in July, 1954 in High Point Park, Sussex County. Browsing deer have already reduced this station to one or two plants. Its position and future is most precarious. Previous reports of its occurrence have not been verified.

23. Heartleaf Twayblade (*Listera cordata*)—the New Durham station of the early nineteenth century was long ago destroyed. One or two colonies have been found in swamps of Kittatinny Mountain in Sussex County.

24. Broad-lipped Twayblade (*Listera convallarioides*)—a small colony was located in a calcareous swamp in Warren County in June, 1954. The drought of that year may have so lowered the water table as to have destroyed the station. This represents an addition to the flora of the State.

25. Northern Coral-root (*Corallorhiza trifida*)—during the past five years nearly a dozen stations have been located in swamps of Passaic, Sussex, and Warren Counties.

26. White Adder's-mouth (*Malaxis brachypoda*)—one of the rarest species in the State. Found at two or three stations in the northern counties. There is a station near Sparta, Sussex County.

27. Sweet Gale (*Myrica gale*)—occurs in swamps and on the borders of ponds and lakes. Most localities are in the northern counties. Still abundant on the shore of Lake Marcia, High Point Park.

28. White Birch (*Betula papyrifera*)—found at scattered points in the mountains of Sussex and Warren Counties. Occurs on the summit of Kittatinny Mountain near entrance to High Point Park.

29. Dwarf Birch (*Betula pumila*)—locally common, chiefly in calcareous swamps of the northern counties.

30. Dwarf Mistletoe (*Arceuthobium pusillum*)—there are several stations for this parasite. It has been found on Black Spruces at High Point Park, Mashipacong Pine Swamp, and Sparta Pine Swamp in Sussex County, and Tock's Swamp, Warren County.

31. Purple Clematis (*Clematis verticillaris*)—many of its former stations have been destroyed. Occurs in the Highlands and more rarely in the Kittatinnies.

32. Goldthread (*Coptis groenlandica*)—widely distributed in swamps and rich woods of the northern counties.

33. Mountain-fringe (*Adlumia fungosa*)—locally distributed in the rocky woods of the northern counties.

34. Foamflower (*Tiarella cordifolia*)—there are two or three known localities in the rich woods of the northern counties. Occurs in Stokes Forest.

35. Three-toothed Cinquefoil (*Potentilla tridentata*)—there is one known station, that listed by Britton for the summit of High Point (1884), where it still persists despite the tramping of many feet, and a layer of cracked, "fill-in" Martinsburg shale strewn over the summit of the mountain.

36. Marsh Cinquefoil (*Potentilla palustris*)—local. It was observed in 1954 in a marsh near Greendel, surrounded on all sides by cattails, and perhaps fighting a losing battle for survival.

37. Broom Crowberry (*Corema Conradii*)—a northern species reaching its southern limit, strangely enough, in the Pine Barrens of New Jersey. Large stands of it still persist on the "Plains" of Ocean and Burlington Counties.

38. Mountain Holly (*Nemopanthus mucronata*)—found in a number of swamps in the northern counties, south at least to Cheesequake State Park, Middlesex County.

39. Alpine Enchanter's Nightshade (*Circaea alpina*)—locally distributed in rich woods of the Highlands and the Kittatinnies.

40. Dwarf Cornel (*Cornus canadensis*)—found at numerous localities in both dry and moist woods and in swamps of the northern counties, south at least to the Great Swamp of Morris County.

41. Labrador Tea (*Ledum groenlandicum*)—there is one station for the species, in a swamp near Mt. Hope, Morris County.

42. Rhodora (*Rhododendron canadense*)—two or three small stations are known in the northern counties, one of which is on the Appalachian Trail near Sunfish Pond, Warren County.

43. Bog Laurel (*Kalmia polifolia*)—known from half-dozen or more stations in bogs and muskegs of the northern counties. Still present in the Budd Lake Bog and at Mashipacong Pine Swamp.

44. Bog Rosemary (*Andromeda glaucophylla*)—frequently associated with the Bog Laurel, also occurring at the above-named localities.

45. Creeping Snowberry (*Gaultheria hispidula*)—rare and local in swamps of the northern counties. Has been recorded from Sparta Pine Swamp [and] Mashipacong Pine Swamp, Sussex County and from a muskeg north of Cedar Pond, Passaic County.

46. Small Cranberry (*Vaccinium Oxycoccos*)—found in the muskegs of Passaic and Sussex Counties.

47. Narrow-leaved Gentian (*Gentiana linearis*)—two stations had been located in the past. Whether the species still occurs at Budd Lake is unknown. A few plants were found at the station south of Greenwood Lake in Passaic County in 1954, but the meadow is fast changing in character and the species may not long survive.

48. Bogbean (*Menyanthes trifoliata*)—occurs at a number of localities in the northern counties, including roadside marshy spots, muskegs and swamps.

49. High-bush Cranberry (*Viburnum trilobum*)—thickets at a number of stations in the northern counties.

50. Red-berried Elder (*Sambucus pubens*)—edges of woods and roadsides at scattered localities in the northern counties.

51. Kalm's Lobelia (*Lobelia Kalmii*)—calcareous meadows and pond edges in Sussex and Warren Counties.

52. Water Lobelia (*Lobelia Dortmanna*)—locally distributed in ponds and lakes of the northern counties and at Bamber Lake, Ocean County in the Pine Barren region.

20 "Lost" Plants

The face of the land in a state as densely populated and as highly industrialized as New Jersey is constantly changing. Add to this many thousands of acres which have been altered so that food might be grown for this vast population and one marvels that wild-life and plant life have survived as well as they have. By the latter part of the nineteenth century (1889) Britton's **Catalogue of the Plants of New Jersey** appeared. The thoroughness of the early field workers is indicated by the fact that few species have been added to the State List since the appearance of that Catalogue. Witmer Stone's **Plants of Southern New Jersey** (1911) brought the status of the Coastal Plain plants up to date. Since that time little has been written on the Flora of New Jersey.

During the nineteen twenties Messrs. Ludlow Griscom, Kenneth K. Mackenzie and Waldron de Witt Miller travelled extensively in New Jersey, adding several new species to the State List. During the nineteen thirties, nineteen forties, and down to the present, Messrs. James L. Edwards, Louis E. Hand and Guy Nearing have been active in the field, relocating old stations, finding new ones, and also adding a few species to the ever-growing list. During the past decade they have been joined by others who have also searched ardently for new species, or for new and old stations of rare or retiring members of the flora. Among those engaged in this absorbing phase of botanical work are David Fables, Estill I. Green, Frank and Robert Hirst, J. Harry Lehr, Robert Leisy, Mildred and Raymond Wood. Undoubtedly many others from New Jersey and surrounding states have enjoyed many pleasant days afield, botanizing in the intriguing Pine Barrens and in the mountains of the northern counties.

Despite this activity, many of the species once known to be components of the State flora cannot be located. In hopes that future search may uncover one or more of these species a list of twenty "lost" plants has been prepared. Possibly someone knows a station for one or more of them, but this information was unknown to the compiler. It presents a challenge for future activity in the field.

1. Slender Cliff-brake (*Cryptogramma Stelleri*). Reported by Prof. Austin from a ravine in Godwinville, Passaic County. This station was relocated in the 20th century and would be Wortendyke, Bergen Co. on present maps. The station was small and the drought conditions of the past few summers appear to have caused its extermination. Prothallia, however, may exist and with the return of normal moisture conditions the species might again appear.

2. American Frog's-bit (*Lymnobium Spongia*). Collected at Swimming River, Monmouth Co., prior to 1889. There are no subsequent records and the species is probably extinct in the State.

3. Knotted Spike-rush (*Eleocharis equisetoides*). Found at Repaupo Bog, Gloucester Co., in 1892. Modern highway construction has ruined portions of this region and whether or not this species persists is not known.

4. Long's Wool-grass (*Scirpus Longii*). Discovered by Witmer Stone in a swamp between Chatsworth and Speedwell, Burlington Co. Four stations were listed by Stone in his **Plants of Southern New Jersey** (2 miles n. of Speedwell, Andrews, Sicklerville, Winslow Junc.). No stations are known today, but it is probably extant, and may be relocated by persistent search.

5. Knieskern's Beaked-rush (*Rhynchospora Knieskernii*). Type specimens for this species were collected by Dr. Knieskern at Point Hollow, Ocean Co. (between Lakehurst and Cassville). Subsequently it was obtained at a dozen or more localities, all of them in the Pine Barrens, and usually reported growing on bog iron ore. The species undoubtedly still occurs in the State, but those field botanists asked about its present "whereabouts" were unable to shed any light on the subject. Local residents are unable to indicate the location of Point Hollow.

6. Northern Green Bog Orchis (*Habenaria hyperborea*). Both Gray's **Manual** (6th edition) and Britton's **Catalogue** (1889) list this species as occurring in New Jersey. Britton gives two localities: Ramapo Mt. near the State line in Bergen Co.; and a swamp on the east side of Wawayanda Mt., Sussex Co. The former locality may still exist, and so may the latter, though in the case of the latter there is the possibility that the swamp mentioned may have been flooded when Highland Lake was created. There is also the possibility that the species was misidentified and it may have been the following species (*H. dilatata*). The latter is listed in the 7th and 8th editions of Gray's **Manual,** whereas *H. hyperborea* has been deleted. The herbarium sheets from which the above records probably derived cannot be located.

7. White Bog Orchis (*Habenaria dilatata*). Listed in Gray's **Manual**, 7th and 8th editions as occurring in northern New Jersey. There are no specific localities known, and possibly the stations mentioned above for *H. hyperborea* refer to the present species. It may be found at some future date in the swamps of Kittatinny Mt., the Highlands, or Ramapo Mt.

8. Wister's Coral-root (*Corallorhiza Wisteriana*). Britton's **Catalogue** does not list this species. Stone's **Plants of Southern New Jersey** mentions one station: Swedesboro, Gloucester Co. There are specimens from several localities in South Jersey in the Herbarium of the Academy of Natural Sciences of Philadelphia, the latest record for which appears to be 1892. Persistent search in the southwest counties during the past 5 years has failed to reveal a station, and much of the region is now farmland or overgrown with Japanese Honeysuckle.

9. Cinquepin (*Castanea pumila*). Though it may still occur at some of its former stations (from Mercer to Salem Counties) it cannot at present be accounted for. The blight which destroyed the Chestnut may have eliminated this species, or reduced it to a few specimens.

10. Cork Elm (*Ulmus Thomasi*). A single tree was reported along the Lehigh and Hudson River R. R. above Woodruff's Gap, Sussex Co. in 1887. Recent field work has failed to uncover this tree or a possible descendent.

11. Pawpaw (*Asimina triloba*). According to Britton's **Catalogue**, this species was abundant along Crosswick's Creek, Mercer Co. (on authority of C. C. Abbott); also reported from Ridge's Island, Delaware River, Hunterdon Co.; and from Thompsontown, near May's Landing, Atlantic Co. Stone was unsuccessful in attempts to find the species growing naturally in the State, and he could merely quote the records in Britton's **Catalogue**. There seem to be no recent observations of this southern species.

12. Squirrel-corn (*Dicentra canadensis*) . Prof. Austin reported the species from Sussex County prior to 1874 (Willis' Catalogue). Britton stated that it had not been observed subsequent to Austin's report and that there was no specimen in Austin's herbarium to substantiate the record. It was, however, observed by field botanists later along the Delaware River below Lambertville, Hunterdon County in the early part of the 20th century. Though no recent observations have been made, it probably is extant.

13. Robin-run-away (*Dalibarda repens*). Stone lists this species as occurring two miles northwest of Swedesboro, Gloucester County, the only known station in New Jersey. A boreal species such as this might be expected in the northern counties, but to date there is no record. There are no recent reports of the plant near Swedesboro. It may persist, but there is also the possibility that the expansion of farm areas in this region may have obliterated the station.

14. Sensitive-joint Vetch (*Aeschynomene virginica*). This southern plant formerly ranged along the shores of the lower Delaware River in Salem County (Salem), Gloucester County (Bridgeport), and Camden County (Kaighn's Ferry) and also inland at Swedesboro and Centre Square, Gloucester County. There are no recent reports of the species, but it may persist at one or more of the above stations.

15. Awned Meadow-beauty (*Rhexia aristosa*). Type specimens were collected in 1888 at Egg Harbor City, Atlantic County. It was later (1898) collected at Cologne, a few miles distant, but no other New Jersey localities were ever reported for the species. Recent diligent field work has failed to reveal either of the above stations. Expansion of the former community may have obliterated its specimens.

16. Tall Rattlesnake-master (*Eryngium yuccifolium*). There are two 19th century records, both of them in "dry sand" between Atsion and Quaker Bridge, Burlington County. This area remains virtually unchanged and the species may still occur. Last collected August 25, 1897.

17. Sea-Milkwort (*Glaux maritima*). Once collected at Deal Beach, Monmouth County prior to 1889. There is no doubt this area has been destroyed. There are few localities along the New Jersey Coast today that might support the species.

18. Striped Gentian (*Gentiana villosa*). A single specimen was collected near Bridgeton, Cumberland County in 1881. There have been no additional records.

19. Jacob's-ladder (*Polemonium Van-Bruntiae*). Reported from a swamp near Washington, Warren County by both Garber and Porter prior to 1889, but field work in the 20th century has failed to uncover the station.

20. Twinflower (*Linnaea borealis*). First recorded from the New Durham swamp, and later from the vicinity of Paterson, both stations now destroyed. In the 20th century a small colony was located in a swamp on Jenny Jump Mountain near Mountain Lake. At present it cannot be found.

Some Field Records for the 1954 Season

Purple Fringeless Orchid (*Habenaria peramoena*). In late July Estill Green located a station for this species, the one in as precarious a position as any orchid extant in New Jersey. There were over thirty plants in a meadow in Monmouth County. Prior to this discovery there was only one specimen that could be located, a remnant of what had been an extensive station in years prior to the great industrial expansion in Middlesex County. This discovery brings the species back from the verge of extinction in the State.

Dwarf Rattlesnake-plantain (*Goodyera repens* var. *ophioides*). In late July a small colony of about a dozen or so plants of this species was found in the Cedar Swamp in High Point State Park, Sussex County, by David Fables. None of the plants flowered. Browsing by deer decimated their numbers by the year's end and only one or two were left by December. If another group is located it should be protected by a wire fence from the understandable browsing of hungry deer. Upon what grounds the inclusion of this species in Gray's **Manual** is based is unknown. There seems to be no herbarium material to substantiate the range given by Fernald.

Broad-lipped Twayblade (*Listera convallarioides*). On June 19 two specimens of this orchid, heretofore unrecorded in New Jersey, were discovered by David Fables in a swamp in the limestone belt, near Greendel, Sussex County. One of the plants bloomed. The area suffered for the second successive season from drought, and the water table dropped below a safe level for some of the shallow-rooted species. Whether they have survived is not known at this time. The range of the present species given in Gray's **Manual** is Newfoundland s. to n. N. E. and in the mts. to N. Car.

Linear-leaved Gentian (*Gentiana linearis*). This species had been located prior to 1889 at Budd Lake, Morris County, but there are no records of it there in this century. Waldron de Witt Miller discovered another station in a meadow near Uttertown, Passaic County, in the nineteen-twenties. James L. Edwards later located this station. Prior to 1954 it had not been observed for some years and unsuccessful attempts had been made to locate the station. In early August, 1954, several plants were found by Frank Hirst, David Fables and Walter Kennedy in the meadow Mr. Edwards had suggested they search. The meadow is becoming overgrown, and its character is no doubt quite different from what it was when located by Mr. Miller.

Three additional numbers of the Caesarian Flora and Fauna containing botanical material were subsequently published, and if space permits may be republished in future issues of Bartonia. They include reports of the rediscovery of certain of the "lost" species of New Jersey, of which the finding of a huge colony of the Awned Meadow-beauty is especially noteworthy.

Alas, Dave Fables' optimism concerning the persistence of the Showy Lady's-slipper has proved a bit premature. The person referred to in a previous issue as J. Vandal Doe has sought out and removed to his garden practically every plant of this species from at least the more accessible colonies.

Philadelphia Botanical Club Records, 1960

Program of Meetings

Date	*Subject*	*Speaker*	*Attendance*
1960			
Jan. 28	Nature Lore	Mrs. Charles J. Allen, Jr.	61
Feb. 25	Exploring and Collecting Plants Beyond the Frontiers of Northern British Columbia	Mrs. J. Norman Henry	44
Mar. 24	A Trip to the Far East—Hong Kong, Formosa and Japan	Dr. Hui-Lin Li	41
Apr. 28	Lichens	W. L. Dix	45
May 21	Trip to Bowman's Hill Wild Flower Preserve	Dr. Edgar T. Wherry, Leader	11
Sept. 22	Reports by Members on Summer Activities		22
Oct. 27	Our Eastern Forests	Richard T. T. Forman	44
Nov. 17	Liliaceae of Eastern North America	Dr. Ralph M. Sargent	42
Dec. 15	Plants of Bogs and Barrens	Dr. Edgar T. Wherry	29

Officers and Members, 1960–1961

Mrs. J. Norman Henry, *President*
Hugh E. Stone, *Vice President*
Ralph M. Sargent, *Vice President*
Walter M. Benner, *Secretary*
William L. Freyburger, *Treasurer*
Bayard Long, *Curator*
Edgar T. Wherry, *Editor*

ACTIVE MEMBERS (as of December 31, 1961)

	Elected
Mrs. C. J. Allen, Jr., Woodside Lane, Riverton, N. J.	1957
Mrs. F. E. Atkins, 3422 Queen Lane, Philadelphia 29, Pa.	1953
Mrs. A. C. Barnes, Box 128, Merion Station, Pa.	1942
Edwin B. Bartram, Bushkill, Pa.	1906
Dr. Walter M. Benner, 5636 Loretta Ave., Philadelphia 24, Pa.	1912
Dr. David Berkheimer, Limekiln, Berks Co., Pa.	1943
William C. Brumbach, 850-D Berkshire Drive, Reading, Pa.	1943
Miss Margaret Butler, 4598 Castor Ave., Philadelphia 24, Pa.	1953
Richard B. Chillas, 233 Winona Ave., Philadelphia 44, Pa.	1942
John W. Coburn, 801 S. Gilbert St., Ada, Ohio	1951
Miss Carola S. Collings, 1728 Pine St., Philadelphia 3, Pa.	1954
W. L. Dix, 801 Crown St., Morrisville, Pa.	1942
Albert Donaghy, Jr., 6121 N. 6th St., Philadelphia 20, Pa.	1952
Dr. Francis Drouet, Academy of Natural Sciences, Philadelphia 3, Pa.	1961
Miss Elizabeth C. Earle, 132 Carlton Place, Media, Pa.	1935
Mrs. Nellie Erisman, 508 S. 41st St., Philadelphia 4, Pa.	1945
Mrs. Harold Evans, Awbury, E. Washington Lane, Philadelphia 38, Pa.	1931
Mrs. W. Brooks Evert, 430 Thomas Ave., Riverton, N. J.	1957
Carl W. Fenninger, 8304 Stenton Ave., Philadelphia 18, Pa.	1947
Miss Elizabeth H. Flavell, 6146 Wayne Ave., Philadelphia 44, Pa.	1946
Sister M. Flaventia, Holy Family College, Torresdale, Philadelphia 14, Pa.	1958

Dr. John M. Fogg, Jr., 6807 Quincy St., Philadelphia 19, Pa.	1921
Mrs. John M. Fogg, Jr., 6807 Quincy St., Philadelphia 19, Pa.	1961
Adrian Ford, 10 Wilde Ave., Drexel Hill, Pa.	1959
Mrs. Adrian Ford, 10 Wilde Ave., Drexel Hill, Pa.	1959
William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa.	1956
Mrs. William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa.	1956
Mrs. John F. Gall, 128 Fairview Rd., Penn Valley, Narberth, Pa.	1959
John Gill, Box 1115, R. D. 1, Brown's Mills, N. J.	1939
Dr. Thomas S. Githens, Cambridge Apts., Philadelphia 44, Pa.	1945
Dr. Robert B. Gordon, 415 Sharpless St., West Chester, Pa.	1942
John F. Gyer, Jessup Mill Rd., Clarksboro, N. J.	1960
Dr. Theodor P. Haas, 514 S. 44th St., Philadelphia 4, Pa.	1946
Louis E. Hand, Box 46, New Lisbon, N. J.	1936
Miss Ann Harbison, The Barclay, 18th & Rittenhouse Sq., Philadelphia 3, Pa.	1944
Mrs. J. Norman Henry, Gladwyne, Pa.	1932
J. Norman Henry, Jr., 410 Mulberry Lane, Haverford, Pa.	1956
Miss Josephine de N. Henry, Gladwyne, Pa.	1938
A. H. Holcombe, Jr., 1330 Youngs Ford Rd., Gladwyne, Pa.	1949
Mrs. A. H. Holcombe, Jr., 1330 Youngs Ford Rd., Gladwyne, Pa.	1949
Mrs. John M. Huebner, 150 Anton Rd., Wynnewood, Pa.	1958
Mrs. M. L. Kendig, 65 S. Main St., Manheim, Pa.	1935
Robert L. Kendig, 75 Street Road, Southampton, Pa.	1955
Miss Natalie B. Kimber, 538 E. Locust Ave., Philadelphia 44, Pa.	1928
Ludwig A. Koelnau, 2038 Race St., Philadelphia 3, Pa.	1952
Mrs. Ida K. Langman, 3509 Baring St., Philadelphia 4, Pa.	1937
John A. Lester, 5 College Circle, Haverford, Pa.	1960
Miss Elizabeth H. Lewis, 400 S. 45th St., Philadelphia 4, Pa.	1954
Dr. Hui-Lin Li, Morris Arboretum, Philadelphia 18, Pa.	1944
Dr. Harry A. Lloyd, 200 N. 35th St., Philadelphia 4, Pa.	1931
Bayard Long, 250 Ashbourne Road, Elkins Park, Philadelphia 17, Pa.	1906
Mrs. C. P. Mann, Cherry Lane, Riverton, N. J.	1957
James R. McGrath, 56 Whartman Road, Graterford, Pa.	1961
Mrs. Charles J. McKinney, 233 Rex Ave., Philadelphia 18, Pa.	1961
Miss Mary O. Milton, 9412 Stenton Ave., Philadelphia 18, Pa.	1961
Charles E. Mohr, 10 Beacon Hill Lane, Valley Forge, Pa.	1959
Dr. Edwin T. Moul, Dept. of Botany, Rutgers University, New Brunswick, N. J.	1945
A. Edward Murray, Jr., 70 Kraft Lane, Kenwood, Levittown, Pa.	1960
Raymond Nelson III, 225 Weymouth Road, Darby, Pa.	1961
Mrs. Edward Norman, 1288 Puritan Ave., Woodbury, N. J.	1961
Dr. Frederick M. Oldach, 323 Wellesley Road, Philadelphia 19, Pa.	1951
Mrs. George P. Orr, Willow Brook Farm, Paoli, Pa.	1935
Walter Palmer, Route 35, Media, Pa.	1952
Mrs. Frank Parker, 400 S. 45th St., Philadelphia 4, Pa.	1950
Dr. Ruth Patrick, P.O. Box 4095, Chestnut Hill Sta., Philadelphia 18, Pa.	1937
Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
Dr. Charles W. Reimer, 856 Cricket Road, Secane, Pa.	1953
Dr. Cecilia Riegel, B502 Merion Gardens, Merion, Pa.	1957
Dr. Robert Robbins, Temple University, Dept. of Radiology, Philadelphia 40, Pa.	1954
Miss Marjorie Roberts, London, England	1960
Dr. Robert Robertson, 508 South 41st St., Philadelphia 4, Pa.	1960
Mrs. Robert Robertson, 508 South 41st St., Philadelphia 4, Pa.	1960
Mrs. Philip Q. Roche, Harts Lane, Miquon, Pa.	1953
Miss Anne Rowland, Meadowbrook, Pa.	1948

Mrs. Karl Rugart, 612 Bryn Mawr Ave., Penn Valley, Narberth, Pa.	1942
Dr. Ralph M. Sargent, 4 College Circle, Haverford, Pa.	1948
Dr. Robert L. Schaeffer, Jr., 30 N. 8th St., Allentown, Pa.	1938
Miss Dorothy Scott, 2359 E. Cumberland St., Philadelphia 25, Pa.	1959
James R. Steel, Jr., 8349 Jeanes St., Philadelphia 11, Pa.	1961
Dr. C. I. Stiteler, 507 Welsh Street, Chester, Pa.	1945
Hugh E. Stone, White Hall Apts., Haverford, Pa.	1892
Mrs. George Stoops, Providence Rd., Media, Pa.	1960
Miss Mary Sullivan, Montgomery Court L 23, Narberth, Pa.	1954
Miss Elizabeth Thorp, 403 S. 41st St., Philadelphia 4, Pa.	1953
Robert J. Titherington, 6317 N. Norwood St., Philadelphia 38, Pa.	1942
Harry W. Trudell, 1309 Highland Ave., Abington, Pa.	1915
Mrs. J. H. Vance, 148 Montgomery Ave., Bala-Cynwyd, Pa.	1950
Charles H. Van Housen, 5022 Erringer Place, Philadelphia 44, Pa.	1954
Jesse T. Vogdes, N. Lemon St., Media, Pa.	1960
Mrs. Jesse T. Vogdes, N. Lemon St., Media, Pa.	1958
Dr. Paul R. Wagner, 789 Main St., Collegeville, Pa.	1935
E. Perot Walker, 3009 Park Road, Lafayette Hills, Pa.	1939
Mrs. E. Perot Walker, 3009 Park Road, Lafayette Hills, Pa.	1958
Mrs. W. B. Warden, 731 Yale Ave., Swarthmore, Pa.	1960
Miss Ann Waterman, 916 Pine St., Philadelphia 7, Pa.	1961
Albert J. Webb, 351 Oak Terrace, Wayne, Pa.	1959
Dr. Lily A. Weierbach, 5220 Wayne Ave., Philadelphia 44, Pa.	1958
Dr. Edgar T. Wherry, 228 Harvey St., Philadelphia 44, Pa.	1925
Hans Wilkens, 424 S. 15th St., Reading, Pa.	1928
William H. Witte, R. D., Riegelsville, Pa.	1898
Mrs. Richard D. Wood, Jr., Wawa, Pa.	1961
James Woodford, Cedar Run Lake, Marlton, N. J.	1959
Mrs. James Woodford, Cedar Run Lake, Marlton, N. J.	1959
Miss Mary F. Wright, 231 Winona Ave., Philadelphia 44, Pa.	1928
Mrs. H. Winfield Wright, 515 Folcroft Ave., Folcroft, Pa.	1959

CORRESPONDING MEMBERS

Dr. Harold St. John, Box 33, A.P.O. 143, San Francisco, Calif.	1927
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich.	1921
Dr. Heber W. Youngken, Massachusetts College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

David G. Fables, Jr.	February 22, 1961
Dr. Samuel C. Palmer	October 30, 1961
Carl E. Bliss	December, 1961

Samuel C. Palmer

Samuel C. Palmer, Emeritus Professor of Botany at Swarthmore College, died October 30th at the age of 87. A native of Delaware County, Pa., he received a B.S. degree at Swarthmore College in 1895 and Ph.D. in Biology at Harvard University in 1911. Joining the faculty at Swarthmore in 1909, he at first taught biology, botany and geology, as well as serving as Director of Athletics; he was Professor of Botany from 1928 until his retirement in 1942. A gifted artist, he made several thousand charming water-color drawings of over 1,500 native plants of Delaware Co., which are on file in the Swarthmore College library.

7713

No. 32 1961-62

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

CONTENTS

Sporadic Culm Formation in *Scirpus longii* .... ALFRED E. SCHUYLER 1

The Pine Barren Conservationists .... DOROTHY S. EVERT 6

Caesarian Flora and Fauna

Pteridophytes and Monocots .... Compiled by DAVID FABLES, JR. 7

Additions to the Flora of Atlantic and Burlington Counties (Including Some Relocated Species) .... Compiled by DAVID FABLES, JR. 11

Philadelphia Botanical Club Records

Program of Meetings, 1961 13

Program of Meetings, 1962 13

Trips, Officers and Members, 1962 14

PUBLISHED BY THE CLUB
ACADEMY OF NATURAL SCIENCES, NINETEENTH AND THE PARKWAY
PHILADELPHIA 3, PENNSYLVANIA
Subscription Price, $1.00. Back Numbers, $1.00 each.
ISSUED MAY 15, 1963

MISSOURI BOTANICAL
JUN [illegible] 1963

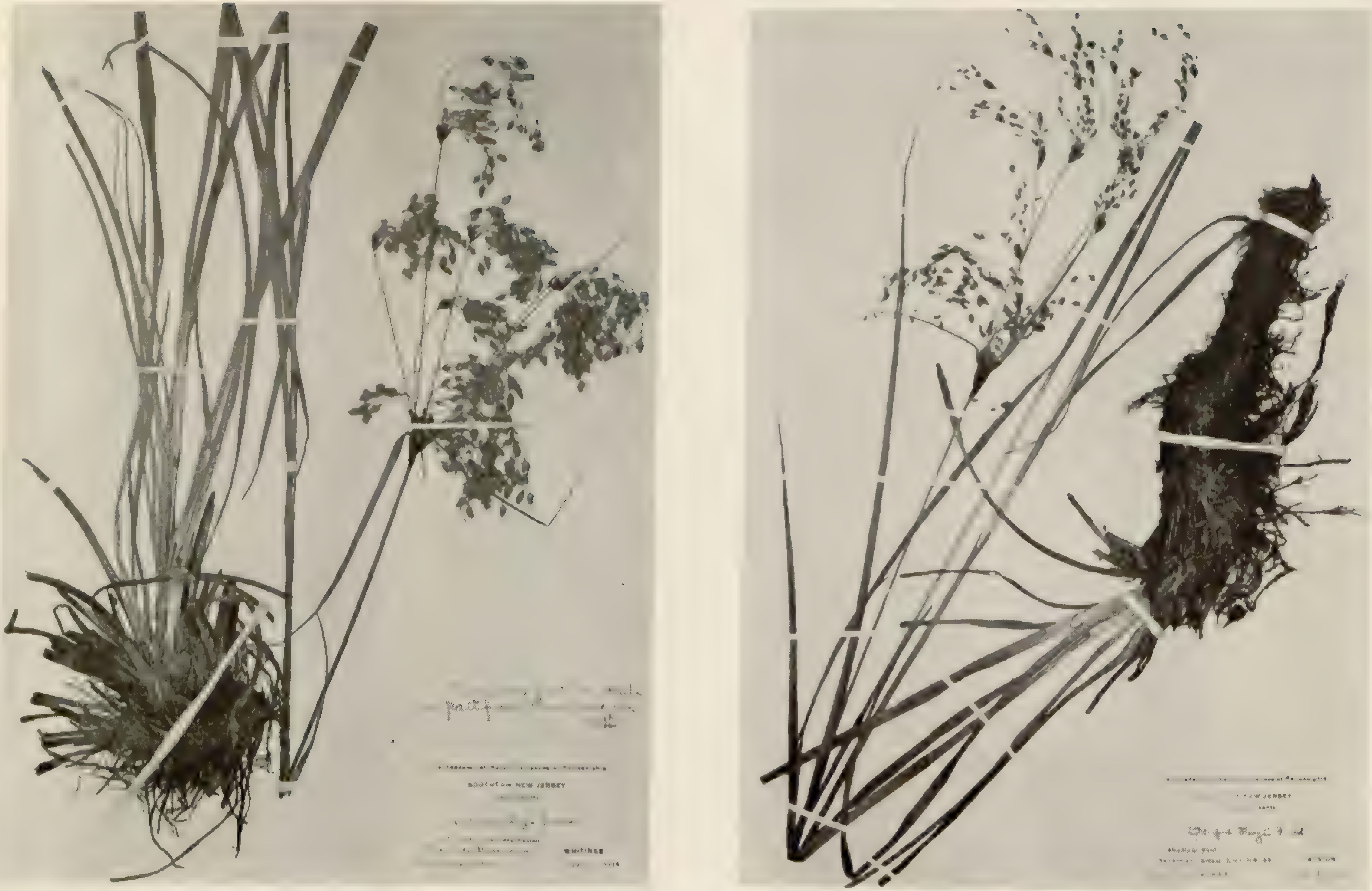


Plate I. A. Specimen (*Long 10350*) showing well developed culm and inflorescence. B. Specimen (*Long 25822*) showing thick elongate rhizome.

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

No. 32 1961–62

Sporadic Culm Formation in *Scirpus longii*

ALFRED E. SCHUYLER

Academy of Natural Sciences of Philadelphia

Although *Scirpus longii* Fern. had been collected previously in New England, the first person to suggest that it deserves recognition as a species distinct from *Scirpus cyperinus* (L.) Kunth (*sens. lat.*, including *S. atrocinctus* Fern., *S. pedicellatus* Fern., and *S. rubricosus* Fern.) was Witmer Stone, after he collected it in the New Jersey pine-barrens in 1909. During the following year, Bayard Long made a thorough study of this species and forwarded his results to M. L. Fernald of the Gray Herbarium. In the meantime, collections from the Boston area came to Fernald's attention. After studying specimens from eastern Massachusetts and the New Jersey pine-barrens with the aid of Mr. Long's critical notes of the New Jersey material, Fernald described this species in Rhodora (Fernald, 1911). Since this publication, the specific status of this truly unique sedge has never been challenged.

Both *S. longii* and *S. cyperinus* (*sens. lat.*) are included in section *Trichophorum* (Pers.) Darl. by most authors. Although they are distinct species, evidence from the study of natural hybrids suggests that *S. longii* and *S. cyperinus* are closely related (Schuyler, unpublished). Useful characters for differentiating *S. longii* from *S. cyperinus* and other species of *Scirpus* are its red-brown fruits, glutinous-based involucral bracts, and thick elongate rhizome. In the absence of culms, *S. longii* may be identified by observing the rhizome, which is longer and thicker than that of *S. cyperinus*. The shorter rhizomes of *S. cyperinus* are probably responsible for the development of tussocks in this species. Plants of *S. longii* spread more evenly over the substrate, and tussocks are not formed. See plate 1 for illustrations of the culm, inflorescence, and rhizome.

In New Jersey, the habitat of *S. longii* appears to be rather specialized. The following information was quoted by Fernald (1911) from a letter written by Mr. Long: "The habitat is quite characteristic . . . It might be called an open pine-barren marsh, scarcely 'bog.' It is the peculiar open area in the pines, supporting commonly only herbaceous vegetation and surrounded by thickets and woods, that occurs mostly along or in the vicinity of the bigger streams. It is not characteristically sphagnous and the vegetation is mostly rank. In spring it is generally quite flooded, but dries out during the summer. The *Scirpus* at Andrews was in a foot, or probably more, of water." In contrast to *S. cyperinus*, which frequently grows in roadside ditches, cranberry meadows, and other moist habitats in and around the pine-barrens, *S. longii* seems to be almost entirely restricted to the habitat described by Mr. Long. The factors which restrict it to this particular habitat are not known.

To date, *S. longii* has been collected in New Jersey, Connecticut, Massachusetts and Nova Scotia. Fernald (1943) reported it from North Carolina but this report is based on a specimen which is not *S. longii.* This [Lenoir Co.: 1½ mi. southeast of Kinston, wet sand bordering pond, July 9, 1922, *L. F. and Fannie R. Randolph 579* (GH)] is an anomalous specimen of *S. cyperinus* which resembles var. *brachypodus* (Fern.) Gilly (*S. atrocinctus* Fern.). Its occurrence here, quite beyond the range of this variety, is surprising. Fernald also mentioned that a colony of *S. longii* had been found on Long Island, but to date, I have seen no specimen to confirm this report. In New Jersey, there are numerous collections of *S. longii* between 1909 and 1923 from the pine-barrens, but only two specimens with culms have been collected since this period. In Connecticut it was collected in one locality in 1915; in eastern Massachusetts it was collected in a few localities between 1900 and 1914 (there are also some earlier collections from Massachusetts dating well back into the 19th century) but has only been collected once since 1914; in Nova Scotia it was collected in one locality in 1941. To summarize the herbarium records, collections prove to have been made at 1, 2 or rarely 4 localities per year in the following: Mass., 1900, 1908, 1911, 1913, 1914, and 1950; N. J., 1909, 1910, 1914–17, 1919, 1922, 1923, 1956 and 1962; Conn., 1915; and Nova Scotia, 1941.

The above data indicate the sporadic nature of culm formation in *S. longii.* In New Jersey, with one exception, collections have been made in each locality only during one year. Mr. Long has recently informed me that he has not been able to find culms in localities where he collected *S. longii* in former years. My observations of a large population of *S. longii* northeast of Atsion for the past three summers are similar. No culms were produced by plants in this population during that period of time. Apparently Mr. Long recognized the sporadic nature of culm formation at an early date as indicated in his letter to Fernald (Fernald, 1911): "But in our two other localities, though stools of apparently the same plant were common, only a single fruiting culm was found at each."

Present evidence suggests that moisture is an important factor regulating culm formation. Vegetative plants of *S. longii*, which were transplanted from the population which I have been observing northeast of Atsion, produced abundant culms when they were grown under less moist conditions at the University of Michigan Botanical Gardens. Basal parts of the plants growing in this population are submerged throughout the summer, but the plants grown in the Gardens were never exposed to such wet conditions; they were watered daily but never to the extent that basal portions of the plants were actually submerged. It is interesting to note that specimens from 7 of the 18 localities for *S. longii* in New Jersey have charred basal leaves, indicating that fires had occurred prior to culm formation. Furthermore, at least 9 of the 18 New Jersey localities occur along railroad tracks where fires could have been caused by coal-burning locomotives. Specimens collected by F. F. Forbes (Plantae Exsiccatae Grayanae 144) along the Charles River in Dedham, Massachusetts likewise have charred basal leaves. The occurrence of such fires might be related to dry conditions which enhance culm formation in *S. longii.*

It is possible that fire, instead of merely being an indicator of dry conditions, may directly affect the water content of the habitat immediately around the plants themselves, so that culm formation occurs in spite of wet conditions. On the other hand, it is difficult to understand how fires could burn over the wet habitat of *S. longii,* unless conditions had already become drier than usual. Quite likely, the combination of fire with a dry season creates the most optimum conditions for culm formation in *S. longii.*

The sporadic culm formation of *S. longii* leads to the question of whether the plants have always behaved this way or whether they are headed for extinction. The localized occurrence of *S. longii* near the North Atlantic Coast suggests that this species is a relict. Fernald (1943) considered *S. longii* to be, ". . . an old Coastal Plain type which, like so many other species, became isolated in Nova Scotia before the late Tertiary or early Pleistocene submergence of the continental shelf." Botanical evidence of continuing subsidence of the Atlantic Coast (Bartlett, 1911) implies that culm formation in coastal populations of *S. longii* may be prevented by wetter conditions created by subsidence. However, it is difficult to believe that subsidence would affect some of the pine-barren localities which are as high as ninety feet above sea level (Long 28054).

The fact that all the populations of *S. longii* which occur well above sea level in New Jersey produce culms so infrequently, apparently without exception, indicates that this is probably the normal condition. Such infrequent culm formation, which is correlated with dry conditions supplemented by fire, may be an efficient means for a species to distribute and establish itself in specialized habitats. If the dry conditions are also beneficial for the establishment of seedlings, then it would be to the plant's advantage to produce large amounts of seeds under these conditions. In this way, *S. longii* could establish itself in new localities when conditions are at an optimum; but when wet conditions prevail, culm formation would be prevented and seeds would not be wasted when conditions are not favorable for the establishment of seedlings. Under wet conditions, *S. longii* may spread throughout a given locality by vegetative reproduction.

On the basis of current knowledge, I think that *S. longii* should be regarded as an "old Coastal Plain type," which is restricted to a specialized habitat. Culm formation appears to be enhanced by drier than usual moisture conditions, possibly with the additional influence of fire. Because sporadic culm formation appears to be characteristic of all known populations of *S. longii,* it is likely that it is a normal condition of the species. Such sporadic culm formation may be an efficient means for a species to distribute and establish itself in specialized habitats when conditions are at an optimum.

SPECIMENS OF *S. Longii* EXAMINED [1]

NEW JERSEY: CAPE MAY CO.: Sea Isle Junction, peat bog along P.R.R., Margin of Great Cedar Swamp, July 1, 1919, *B. Long 21861* (PH). ATLANTIC CO.: 1 mile south of Richland, Landis Ave. and Railroad, boggy pond, June 30, 1956, *F. Hirst 15* (PH). CAMDEN CO.: NE of Andrews, along Great Egg Harbor River, June 18, 1910, *B. Long 4008* (PH); *B. Long 4014* (PH, isotype) [although this specimen has the same locality data as the former, apparently there was enough distance between collections to recognize them as coming from separate localities (see information in Mr. Long's letter, Fernald, 1911)]; SW of Williamstown Junct., along A.C.R.R. Br., June 18, 1910, *B. Long 4039* (GH, PH); S of Winslow Junction, Pennypot Stream (Br. of Gt. Egg Harbor R.), along A.C.R.R., June 23, 1910, *B. Long 4273* (PH); Winslow Junction, peaty swale near P.R.R. sta., June 22, 1922, *B. Long 25877* (PH); ca. 1½ mi. SW of Parkdale, sedgey, peaty bog, head of Gun Branch near C.R.R. of N.J., May 26, *B. Long 14749* (PH). [CAMDEN CO.:] Chew Road, open swamps, May 26, 1916, *K. K. Mackenzie 6922* (PH). BURLINGTON CO.: ½ mi. NE of Atsion, shallow pool, savannah-swale, June 22, 1922, *B. Long 25822* (PH); ca. 1½ mi. NE of Atsion, inundated savannah-swale, June 22, 1922, *B. Long 25840* (PH); Atsion, sedgey swale along Springer Creek, June 22, 1922, *B. Long 25846* (PH); ca. 1½ mi. NE of Atsion, on margin of shallow pool adjacent to SW side of road, Sept. 16, 1962, *A. E. Schuyler 3526* (PH); NE of Jackson, bordering West Jersey Cranberry Meadow (natural), sedgey, peaty bog, July 26, 1923, *B. Long 28054* (PH). [BURLINGTON CO.:] Bog along Wading River midway between Jones' Mill and Speedwell, July 9, 1909, *W. Stone 11594* (PH). OCEAN CO.: WSW of Whitings, wet, sandy, peaty depression, Pole Bridge Brook, July 17, 1914, *B. Long 10350* (PH); Forked River, W head of Middle Branch of Forked River, open sedgey, savannah-like bog, July 10, 1915, *B. Long 12960* (PH); ca. 1½ mi. SW of Lakehurst, savannah-bog, along C.R.R. of N.J., July 6, 1917, *B. Long 16589* (PH).

---

[1] Herbarium abbreviations in citations follow *Index Herbariorum.*

[MERCER CO.:] Lawrence, open bog, very local, June 27, 1915, *K. K. Mackenzie 6492* (PH).

CONNECTICUT: HARTFORD CO.: S. Windsor, open, mucky marsh in sand plain, June 18, 1915, *C. A. Weatherby & C. W. Vibert 3649* (NEBC).

MASSACHUSETTS: BRISTOL CO.: Easton, southern part of town in large swamp on main road to Taunton, June 22, July 25, 1914, *F. F. Forbes* (NEBC). NORFOLK CO.: Neponset River Meadows, July 4, 1914, *F. F. Forbes* (NEBC). [NORFOLK CO.:] Dedham, Charles River Meadows, June 26, 1908, *F. F. Forbes* (GH), June, 1911, *F. F. Forbes,* Plantae Exsiccatae Grayanae 144 (CAN, GH, ISC, MICH, MIN, MO, NEBC, NY, PH, US). MIDDLESEX CO.: Cambridge, marshes of Alewife Brook, July 8, 1913, *M. L. Fernald 8945* (GH, NEBC). [MIDDLESEX CO.:] Concord, Great Meadows, July 17, 1859, *H. D. Thoreau* (NEBC).

NOVA SCOTIA: QUEENS CO.: North of Greenfield, shore of Ponhook Lake, peaty marsh, 23 Aug. 1941, *C. A. & Una F. Weatherby 7116* (GH).

SPECIMENS COLLECTED UNDER CULTIVATION: University of Michigan Botanical Gardens, April 29, 1960, *A. E. Schuyler 891* (MICH); May 11, 1961, *A. E. Schuyler 3430* (PH). These specimens are from a transplant which was originally collected in NEW JERSEY: BURLINGTON CO.: ca. 2.6 mi. NE of Atsion, wet clearing, Aug. 12, 1959. Although this is a large population, no culms of *S. longii* were present, and plants could only be collected in their vegetative condition.

Mr. Richard J. Eaton has informed me of the presence of the following specimen in the Herbarium of the New England Botanical Club: MASSACHUSETTS: MIDDLESEX CO.: Concord, Great Meadows, Aug. 2, 1950, *J. W. Brainerd 2568.*

ACKNOWLEDGMENTS

The aid of Bayard Long, Frank and Robert Hirst, and Richard J. Eaton in my search for localities of *S. longii* has been much appreciated. I am also grateful to Mae Herman, Francis Drouet, and Mr. Long for assistance with the manuscript, and to the University of Michigan Botanical Gardens for the maintenance of transplants.

LITERATURE CITED

BARTLETT, H. H. 1911. Botanical evidence of coastal subsidence. Science, N.S. 33: 29–31.

FERNALD, M. L. 1911. A new species of *Scirpus* from Massachusetts and New Jersey. Rhodora 13: 4–8.

———. 1943. *Scirpus longii* in North Carolina. Rhodora 45: 55–56.

The Pine Barren Conservationists

DOROTHY S. EVERT

Riverton, New Jersey

On December 14th, 1957, Mr. Joseph Truncer of the Department of Conservation and Economic Development of the State of New Jersey called together a group of interested naturalists to discuss the formation of an advisory committee to aid the state in the botanical development of the Wharton Tract. From this group the informal but enthusiastic committee entitled the Pine Barren Conservationists was formed. David Fables was selected as chairman, and served faithfully in this capacity until his death on February 22nd, 1961.

Through the years the group has been called upon to aid many Pine Barren projects. Location of various places of botanical interest were mapped during many delightful field trips under David's leadership. While not having official status the group has worked closely with the Department in protecting and listing the unique flora and fauna of this area.

The fruition of the dream of one member was realized late in 1960, when a Nature Trail at Batsto was dedicated. This was developed by the combined efforts of the New Jersey Federation of Women's Clubs—which supplied monies; the Department of Conservation and Economic Development—which supplied land and labor for construction of signs and bridges; and the Pine Barren Conservationists—who explored the area, and carried out the identifying and labeling of plant material. The trail was mapped by J. Albert Starkey of Vineland, and the labeling was done under the leadership of Louis E. Hand of New Lisbon.

The committee has the use of one of the company houses at Batsto, which has been designated the Nature House by the Department of Conservation and Economic Development. A double herbarium case was purchased by the New Jersey Federation of Women's Clubs and the committee is busy assembling a Herbarium. The Hirst brothers of Atlantic County are its curators. This project was started during David's term as chairman.

To commemorate David's position as first chairman, a library has been started at the Batsto Nature House, to be known as The David Fables Memorial Library. This will contain books dealing with the natural and historical aspects of the Pine Barrens and, it is hoped, will provide a valuable reference source, not only for students, amateur naturalists and historians, but for professional botanists as well. For the library to be a success, however, donation of books will be necessary, especially older ones which are now out of print. Anyone wishing to donate appropriate books to this library are requested to contact the writer, who will gladly arrange to transport the books to Batsto.

CAESARIAN FLORA AND FAUNA

Number 3 **May, 1957**

Compiled by David Fables, Jr., for the New Jersey Field Naturalists [1]

Pteridophytes and Monocots

Bulletin #1 included an article on *New Jersey Plants of Northern Affinity.* This list presents in a brief form some species which occur commonly, or at isolated stations, chiefly on the Coastal Plain, and have their centers of distribution to the south of the State. A few species may occur in southeastern New York, but any which occur on the Coastal Plain in New England have been omitted.

The botanically rich and unique Pine Barrens are home to numerous plant species which do not extend farther north, and many of these are listed below. The counties of Cape May, Atlantic, and Burlington are responsible for a large number of the species typical of the states south of ours, but Cumberland, Salem, and Gloucester undoubtedly would add others if they were as well-combed as the former.

1. Lobed Spleenwort (*Asplenium pinnatifidum*)—two New Jersey stations are known, one in Sussex County and one in Hunterdon County. The Sussex County station is the most northerly in the eastern states.

2. Fox-tail Clubmoss (*Lycopodium alopecuroides*)—a coastal plain species which is especially abundant in the Pine Barrens. In Swenson Field and Lake Wapalanne, Stokes Forest, Sussex County occur stations of *Lycopodium inundatum* with individual specimens resembling *L. alopecuroides* and *L. adpressum.* Further study to determine their exact status would be desirable.

3. Carolina Clubmoss (*Lycopodium carolinianum*)—a species of peculiar world-distribution, occurring on all continents except Europe. A characteristic species of the New Jersey Pine Barrens, where its almost constant associate is Curly Grass Fern.

---

[1] In BARTONIA No. 31, *Caesarian Flora and Fauna No. 1* by David Fables, Jr., was reprinted. As several subsequent numbers contained interesting notes on our local flora also, further reprinting has seemed worth while. No. 2 was zoological, but No. 3 and part of number 4 are appropriately presented herewith. As before, typographical errors are corrected and technical botanical names placed in italics.—E. T. W.

4. Loblolly Pine (*Pinus taeda*)—scattered stations occur in Cape May County; a fine stand exists in Town Bank, where the Crane Fly Orchis grows and the Acadian Flycatcher breeds. Not known to be indigenous north of our southernmost county.

5. Pond Pine (*Pinus serotina*)—reported from Cumberland and Cape May Counties. I have personally been unable to locate this species in the State.

6. Short-leaved Pine (*Pinus echinata*)—scattered throughout all the southern counties.

7. Maiden Cane (*Panicum hemitomum*)— occurs in Cape May County.

8. Bristling Panic Grass (*P. aciculare*)—occurs at several localities in Cape May County, the northern limit of the species. First found in the State by Witmer Stone in 1909.

9. Narrow-leaved Panic Grass (*P. angustifolium*)—found by Otway Brown at Green Creek, Cape May County, in 1909. Still the northern limit of the species.

10. Bluish Panic Grass (*P. caerulescens*)—found at Cold Spring, Cape May County in 1909 by Witmer Stone. A small station located at Bennett Bog in 1947 by the writer.

11. Sheathed Panic Grass (*P. cryptanthum*)—discovered by Bayard Long at Folsom, Atlantic County, in 1909. Still the northern limit of the species.

12. Elliott's Panic Grass (*P. scabriusculum*)—like the above species, discovered by Bayard Long at Folsom, July 27, 1909. This also still marks the northern limit of the species.

13. Pursh's Millet Grass (*Amphicarpon purshii*)—in moist spots in the pine barrens.

14. Woolly Beard Grass (*Erianthus alopecuroides*)—rare; occurs at scattered localities in the Pine barrens.

15. Wrinkled Gama Grass (*Manisuris rugosa*)—a sizeable (and expanding) stand occurs in Bennett Bog, Cape May County.

16. Tiny-headed Beaked-rush (*Rhynchospora microcephala*)—this genus has been greatly revised since the appearance of Witmer Stone's *Flora.* The scientific names are those of Gray's *Manual*, 8th edition. This species is found in the savannas along the Batsto and Wading Rivers.

17. Capitate Beaked-rush (*R. cephalantha*)—locally common in savannas along the Batsto and Wading Rivers.

18. Loose-headed Beaked-rush (*R. chalarocephala*)—a newly-described species which ranges north to New Jersey. To be sought in swamps, wet pine barrens and pond margins.

19. Clustered Beaked-rush (*R. glomerata*)—occurs throughout the State.

20. Knieskern's Beaked-rush (*R. knieskernii*)—discovered by Dr. Peter Knieskern, at Point Hollow (near Lakehurst). This type locality remains unknown to the botanists of today. Apparently the species is rare. Occurs where iron ore exists in the substrata. Found outside the New Jersey Pine Barrens only in Sussex County, Delaware.

21. Few-flowered Beaked-rush (*R. oligantha*)—found in savannas along the Batsto and Wading Rivers.

22. Thread-leaved Beaked-rush (*R. filifolia*)—occurs north to Cape May County.

23. Slender Beaked-rush (*R. gracilenta*)—swamps and bogs of the Pine Barrens, the northern limit of its range.

24. Rare-flowered Beaked-rush (*R. rariflora*)—occurs at Bennett Bog, northern limit of its range.

25. Slender Nut-rush (*Scleria minor*)—in boggy depressions in the Pine Barrens.

26. Shining Nut-rush (*Scleria nitida*)—dry sands in the Pine Barrens.

27. Small's Yellow-eyed Grass (*Xyris smalliana = X. elata*)—occurs in Bennett Bog, the northern limit of its range.

28. Twisted Yellow-eyed Grass (*Xyris flexuosa = X. arenicola*)—the Atsion station described by Stone in his *Plants of Southern New Jersey* was evidently relocated in 1952 though smaller in size. No other recent stations are known.

29. Ten-angled Pipewort (*Eriocaulon decangulare*)—common in Pine Barren bogs and swamps.

30. Flattened Pipewort (*Eriocaulon compressum*)—common in Pine Barren bogs and swamps; blooms earlier than the above species.

31. New Jersey Rush (*Juncus caesariensis*)—at numerous stations in the cedar swamps and bogs of the Pine Barrens.

32. Bog Asphodel (*Narthecium americanum*)—endemic in the Pine Barren bogs of New Jersey and Delaware. Abundant in the Martha bog.

33. Turkeybeard (*Xerophyllum asphodeloides*)—common in the dry pine woods of the southern part of the State.

34. Viscid Asphodel (*Tofieldia racemosa*)—a species which is becoming rare as cranberry culture spreads. Still common in Martha bog and at Symme's Place in Burlington County.

35. Coastal Zigadine (*Zigadenus leimanthoides*)—local in moist pine woods and thickets mostly along the coast.

36. Shining Bellwort (*Uvularia pudica* var. *nitida*)—stations have been found recently in Atlantic County by Frank and Bob Hirst, and in Burlington County by Raymond and Mildred Wood. Occurs in thickets.

37. Walter's Greenbrier (*Smilax walteri*)—thickets in the Pine Barrens. Occurs at Quaker Bridge, Green Bank, Atsion, and other localities in Atlantic, Burlington and Cape May Counties.

38. Laurel-leaved Greenbrier (*Smilax laurifolia*)—swamps in the Pine Barrens, the northern limit of its range.

39. Golden-crest (*Lophiola americana*)—an endemic species of New Jersey and Delaware (may be exterminated in latter state). Common in the bogs of the Pine Barrens.

40. Southern Yellow Orchis (*Habenaria integra*)—Gray lists this species as nearly extinct in New Jersey. Actually more stations are known now than five years ago. Still common at Symme's Place;[2] occurs also in savannas along Batsto River and in Penn State Forest.

41. Snowy Orchis (*Habenaria nivea*)—still in luxuriant growth in three of the bogs near Erma and Bennett, Cape May County, the northern limit of its range.

42. Crested Yellow Orchis (*Habenaria cristata*)—occurs in numerous swamps and bogs of the Pine Barrens.

43. Spreading Pogonia (*Cleistes divaricata*)—a southern species on the verge of extinction in our State. A few plants have been found in thickets along the Wading River.

---

[2] At least it was until part of the bog there was plowed up for blueberry culture, and the other part was visited by J. Vandal Doe, who as usual dug every plant of it he could see. —E. T. W.

CAESARIAN FLORA AND FAUNA

Number 4 March, 1958

Edited by David Fables, Jr., for the New Jersey Field Naturalists

Additions to the Flora of Atlantic and Burlington Counties (Including Some Relocated Species)

Frank and Bob Hirst

1. Slender Horned-rush (*Rhynchospora inundata*)—Stone lists four stations. We have found it at a number of localities, all of them being natural Pine Barren ponds. In Atlantic County: (1) three miles west of Newtonville; (2) and (3) two stations near Egg Harbor City; (4) Tremont Avenue in Cardiff. In Burlington County: (5) one-half mile south of De Cou's Pond; (6) Goose Pond, one mile west of High Crossing; (7) two miles south of Indian Mills; (8) two miles southeast of Quaker Bridge.

2. Knieskern's Beaked-rush (*Rhynchospora Knieskernii*)—located on the west branch of Wading River about two and one-half miles north of the "ghost" community of Washington, Burlington County, September 2, 1957. It was present on bog iron ore deposits. Another station was located one mile east of Babcock Creek near the Black Horse Pike (Rt. 40), September 10, 1957. This is a rather unnatural situation on the side of an old gravel pit with no bog ore present.

3. Quill-like Arrowhead (*Sagittaria teres*)—not recorded in Stone's *Plants of Southern New Jersey* (1911). Found in a bog near Egg Harbor City, Atlantic County, July 27, 1957, abundant in wetter parts. A second station was located at Bill Henry Pond six miles south of Mays Landing, Atlantic County, and a third at De Cou's Pond, Burlington County.

4. Swamp Pink (*Helonias bullata*)—a colony found at Scullville, Atlantic County, May 2, 1954. Stone lists Hammonton, but it has not been seen there in many years to the best of our knowledge. He also refers to it as a "characteristic plant of southern New Jersey," though we do not find it so in the Pine Barrens. Nor have we seen it in bogs as he states; seemingly it prefers swamps.

5. Pine Barren Bellwort (*Uvularia pudica* var. *nitida*)—rare and local, according to Stone, on the edges of swamps. We have located two stations in Atlantic County: one in dry woods at Scullville, May 4, 1953; the other, seven miles northwest at Mirey Run in 1954. Ray and Mildred Wood had a station in Burlington County in 1953.

6. Southern Twayblade (*Listera australis*)—after a fruitless nine-year search along Albertson's Branch, north of Hammonton, Burlington County, we finally located a sizeable colony of 100 or more plants at Scullville, April 29, 1956. A small colony was found by Mathilde Weingartner in company with several members of the Torrey Botanical Club in June, 1947, at Forked River. David Fables located another small colony in a Chamaecyparis swamp along Union Branch of Toms River, between Pine Lake Park and Lakehurst, Ocean County, April, 1948. The last colony has since been destroyed because of a rise in the water table, resulting from closing the dam at Pine Lake.

7. Loesel's Twayblade (*Liparis Loeselii*)—two localities have been found: Scullville, July 22, 1955; and Cardiff, Atlantic County, July 27, 1955. The old Longport record listed by Stone is doubtlessly destroyed as the entire island is built up.

8. Green Adder's Mouth (*Malaxis unifolia*)—this represents the first station for southern New Jersey. A small colony was found in a dry *Quercus ilicifolia–Q. marilandica* thicket at Bargaintown, Atlantic County, August 9, 1952, in a most unusual habitat.

9. Awned Meadow-Beauty (*Rhexia aristosa*)—over 5,000 plants were found in a large bog near Egg Harbor City, July 20, 1957. Several members of the New Jersey Field Naturalists have spent many hours during the past five years searching for this species in the vicinity of Egg Harbor City and Cologne, the localities mentioned by Stone. This species was originally discovered by Messrs. E. N. Kilmer and J. C. Gifford, in August, 1888 at Egg Harbor City. N. L. Britton recognized the specimens as representatives of a new species. In 1898 it was collected at Cologne by C. F. Saunders. Since that time its whereabouts have been a mystery. Expansion of homes and industry in the region we feared has possibly eliminated those older stations. It is with a great deal of satisfaction, therefore, that we report the location of such a large station. (In the opinion of the Editor this is the most encouraging relocation of a Pine Barren species since Spreading Pogonia, *Cleistes divaricata*, was relocated by Estill Green and James L. Edwards along Wading River in 1953.)

10. Slender Water Milfoil (*Myriophyllum tenellum*)—Stone lists only three stations in southern New Jersey, none of which are in the Pine Barrens. We found the species at Bill Henry Pond, six miles south of Mays Landing, July 14, 1957. This is a natural Pine Barren pond.

11. Lily-like Parsley (*Lilaeopsis chinensis*)—this species forms extensive mats along the Delaware River in tidal waters. We found it abundant, locally, below the dam at Port Republic, July 17, 1957. This is the only station known at present in Atlantic County. Whether Mackenzie's locality on Barnegat Bay is extant is unknown. It occurs also at Wreck Pond, Monmouth County.

12. Reversed Bladderwort (*Utricularia resupinata*)—one plant was found in a bog near Egg Harbor City, July 20, 1957. This is a very rare, purple-flowered species. Originally collected in the State by Isaac Burk in 1887. A single plant was also found at Martha, Burlington County, in early July, 1947 by David Fables and Gerbert Rebell.

Philadelphia Botanical Club Records, 1961

Meetings

Date	*Subject*	*Speaker*	*Attendance*
Jan. 26	No meeting—Blizzard		
Feb. 23	May Wild Flowers on a Trip To Florida	Mrs. Charles J. Allen, Jr.	51
Mar. 24	Elliottia and other shrubs	Mrs. J. Norman Henry	51
Apr. 27	Magnolias—Illustrated	Dr. John M. Fogg, Jr.	48
May 25	New Studies in Insect Pollination	Miss Josephine deN. Henry	80
Sept. 28	Reports by Members on Summer Activities		30
Oct. 26	Collecting Ferns for Swiss Pines Preserve	Charles E. Mohr	46
Nov. 16	Glimpses of Florida and the West Indies	Dr. John M. Fogg, Jr.	43
Dec. 14	Experiences in Wild Flower Cultivation	Dr. Edgar T. Wherry	53

Philadelphia Botanical Club Records, 1962

Meetings

Date	*Subject*	*Speaker*	*Attendance*
Jan. 25	Mexico City's New Botanical Garden	Dr. Faustino Miranda	44
Feb. 22	The Ericaceae of Eastern North America	Dr. Ralph M. Sargent	38
Mar. 22	Focusing on Fungi	Ruth McVaugh Allen	34
Apr. 26	Alpine Treasures	Mrs. John M. Huebner	40
May 24	The Carpet of the Hills	John F. Gyer	34
Sept. 27	Reports by Members on Summer Activities		24
Oct. 25	Botanizing in Hawaii—1962	Dr. Theodor P. Haas	32
Nov. 15	Spring Flora of the Mediterranean Area—Greece, Italy and France	Dr. Ralph M. Sargent	38
Dec. 27	The Flora of Philadelphia and Vicinity	Dr. Edgar T. Wherry	107

Trips

Date	*Locality*	*Leader*	*Attendance*
June 9	Wissahickon Creek	Dr. John M. Fogg, Jr.	14
July 7	Pine Barrens	Louis E. Hand, Torrey Botanical Club	9 (P.B.C.)
July 14	July—Blooming Azaleas ...	Mrs. J. Norman Henry	11
Aug. 18	Batsto, N. J.	Louis E. Hand	11
Sept. 9	Pine Barrens	Louis E. Hand, Torrey Botanical Club	9 (P.B.C.)

Officers

WALTER M. BENNER, *President*

HUGH E. STONE and RALPH M. SARGENT, *Vice Presidents*

MRS. ROBERT ROBERTSON, *Secretary* WILLIAM L. FREYBURGER, *Treasurer*

BAYARD LONG, *Curator* EDGAR T. WHERRY, *Editor*

NEW MEMBERS

	Elected
MRS. WINTHROP H. BATTLES, Providence Rd., Media, Pa.	1962
LOUIS CORDIVARI, 222 N. Gross St., Philadelphia 39, Pa.	1962
MRS. ALAN CRAWFORD, White House Road, Devon, Pa.	1962
MRS. ROBERT B. GORDON, 415 Sharpless St., West Chester, Pa.	1962
SIDNEY MARGOLIS, 1221 Wingohocking St., Philadelphia 40, Pa.	1962
DR. TILFORD D. MILLER, 215 King Ave., Westmont 7, N. J.	1962
MRS. TILFORD D. MILLER, 215 King Ave., Westmont 7, N. J.	1962
MISS ELIZABETH ORSATTI, 7238 N. 20th St., Philadelphia 38, Pa.	1962
MRS. RALPH M. SARGENT, 4 College Circle, Haverford, Pa.	1962
DR. ALFRED E. SCHUYLER, Academy of Natural Sciences, Philadelphia 3, Pa.	1962

CHANGES OF ADDRESS, 1962

ALBERT DONAGHY, JR., R.D. 1, Pottstown, Pa.
ROBERT L. KENDIG, 67 County Line Rd., Huntingdon Valley, Pa.
LUDWIG A. KOELNAU, 850 N. 22nd St., Philadelphia 3, Pa.
MRS. IDA K. LANGMAN, 248 Harvey St., Philadelphia 44, Pa.
MRS. ALFRED MARTIN (née MILTON), Three Tuns, Ambler R.D. 3, Ambler, Pa.
CHARLES E. MOHR, Kalamazoo Nature Centre, Kalamazoo, Mich.
MRS. E. D. RUDOLPH (née WATERMAN), 300 West Lane, Columbus 1, Ohio
JAMES R. STEEL, JR., 1503 Shoemaker Rd., Abington, Pa.

DECEASED

MISS MARY F. WRIGHT, ...	January 7, 1962

No. 33 1963

BARTONIA

JOURNAL OF THE PHILADELPHIA BOTANICAL CLUB

CONTENTS

Notes on Five Species of Scirpus in Eastern North America .. ALFRED E. SCHUYLER 1

Some Pennsylvania Barrens and Their Flora. I. Serpentine .. EDGAR T. WHERRY 7

Robert Hirst, Nov. 5, 1925–Sept. 27, 1963 .... D. S. E. 12

More Orchid Vandalism in New Jersey .... P. B. C. Conservation Committee 12

Philadelphia Botanical Club Records, 1963

Program of Meetings 13

Trips 13

Officers and Members 14

PUBLISHED BY THE CLUB
ACADEMY OF NATURAL SCIENCES, 19TH & PARKWAY
PHILADELPHIA 3, PENNSYLVANIA
Subscription Price, $1.00. Back Numbers, $1.00 each
ISSUED AUGUST 7, 1964
(Note: No. 32 was issued May 15, *1963*)

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

No. 33 1963

Notes on Five Species of Scirpus in Eastern North America

Alfred E. Schuyler
Academy of Natural Sciences of Philadelphia

Along with possessing other unique features of the Cyperaceae, plants of numerous species described in *Scirpus* differ in a small number of morphological characteristics and in chromosome number. Present evidence indicates that chromosome numbers are consistent for a given taxon and that differences in chromosome number are correlated with morphological differences which lead to the recognition of more than one taxon. Herein, new morphological and cytological evidence is presented to aid in the taxonomic delineation of five North American species. This study is based on collections by the author and specimens on file in the following herbaria: Academy of Natural Sciences of Philadelphia, Arnold Arboretum and Gray Herbarium, Charleston Museum, Duke University, University of Florida, Florida State University, University of Georgia, New York Botanical Garden, University of North Carolina, North Carolina State University, University of Pennsylvania, and United States National Museum. Abbreviations of herbaria in citation of specimens are those of Lanjouw and Stafleu, *Index Herbariorum*, ed. 4 (1959).

Scirpus fontinalis Harper and *S. lineatus* Michx.

According to my field observations and the study of herbarium specimens, plants resembling specimens which Harper (1903) cited with the original description of *S. fontinalis* [Georgia: Sumter County: Leslie, margin of pool of clear cool water, July 6, 1901, *R. M. Harper 1012* (GH, NY, US)] occur locally on the Atlantic Coastal Plain from southeastern Virginia to Florida and Louisiana.

Most commonly these plants grow beside wooded streams and springs. Plants resembling descriptions of *S. lineatus* by Beetle (1947), Fernald (1950), and Gleason (1952), and filed under this name in herbaria [Virginia: York County: old-field swale north of Grafton, June 12, 1940, *M. L. Fernald & B. Long 11982* (GA, GH, US); Alabama: Sumter County: about three miles northeast of Livingston, May 4, 1935, *R. M. Harper 3359* (GH, NY, PH, US)], are widespread in the United States, but often local. They are unknown on the Coastal Plain in the Carolinas and Georgia, but have been collected on the Coastal Plain in Virginia, Florida [one locality in Duval County: about 5 miles east of Jacksonville, Nov. 17, 1929, *H. N. Moldenke 6535* (NY)], Alabama, and Mississippi. Plants of *S. lineatus* usually grow in moist meadows, marshes, and roadside ditches.

Plants referred to these taxa on herbarium sheets appear almost identical. The most consistent differences are the laxness of culms and presence of bulblets in the inflorescences of mature plants of *S. fontinalis* in contrast with the rigidity of culms and lack of bulblets in the inflorescences of mature plants of *S. lineatus,* the more divaricate inflorescence of *S. fontinalis* (difficult to observe when the plant is mounted on a herbarium sheet), the more wavy configuration of the inner walls of epidermal cells of achenes of plants of *S. fontinalis* (as drawn in figure 1), and the presence of 18 meiotic units [1] in pollen mother cells of *S. fontinalis* in contrast with the presence of 20 in those of *S. lineatus* (as drawn in figure 1 and listed in table 1).

Scirpus divaricatus ELL.

Plants resembling type material of *S. divaricatus* [South Carolina: Hab. in humidis pinetis, *272* (type in herb. Elliott, CHARL; isotype in herb. Muhlenberg, PH)] occur in the southeastern United States from Florida to Louisiana and north to southeastern Virginia and southeastern Missouri. Plants referred to this taxon differ from plants of *S. fontinalis* and *S. lineatus* by having more leafy culms, shorter scales and bristles, and more strongly angled achenes. Nevertheless, plants of *S. fontinalis* resemble plants of *S. divaricatus* by having bulblets, a somewhat divaricate inflorescence, and a low number of meiotic units.[2]

Scirpus ancistrochaetus SCHUYL. AND *S. atrovirens* WILLD.

Plants resembling type material of *S. ancistrochaetus* [Vermont: Windham County: 5 mi. N of Bellows Falls, July 3, 1960, *A. E. Schuyler 3051* (MICH, type; NEBC, PH, isotypes)] are known from only a few localities in Pennsylvania,[3] New York, and Vermont, while plants which resemble photographs of type material of *S. atrovirens*[4] (no. 1240 in herb. Willdenow, B) are widespread in the eastern United States. Slender plants of *S. atrovirens,* which have bristles shorter than achenes or lacking, are frequently recognized as var. *georgianus* (Harper) Fern. [Massachusetts: Middlesex County: Winchester, shady pond-margin in woods, July 3, 1941, *L. B. Smith,* Plantae Exsiccatae Grayanae 1111 (PH)] and often grow together with coarser plants, frequently recognized as typical *S. atrovirens,* which have bristles longer than achenes. Putative hybrids between *S. ancistrochaetus* and *S. atrovirens* have been collected in Pennsylvania[5] and Vermont.

---

[1] The bivalent structure of units observed in meiotic prophase I and metaphase I is not always obvious. For this reason, the number of units observed in these meiotic stages, although probably equivalent to the haploid number of chromosomes in most instances, is referred to as the number of meiotic units.

[2] The 14 and 18 meiotic units, observed in pollen mother cells of *S. divaricatus* and *S. fontinalis* respectively, are presently the lowest numbers known among leafy species of *Scirpus*.

[3] Pennsylvania localities of *S. ancistrochaetus*, in addition to those cited with the original

Plants of *S. atrovirens* differ from plants of *S. ancistrochaetus* by having generally shorter and more mucronate scales, shorter and more delicate bristles, and smaller achenes. I have observed 27 meiotic units in pollen mother cells from plants of *S. ancistrochaetus* and 28 in those from plants of *S. atrovirens* (as in figure 1 and table 1). Hicks (1928) reported 28 haploid chromosomes for

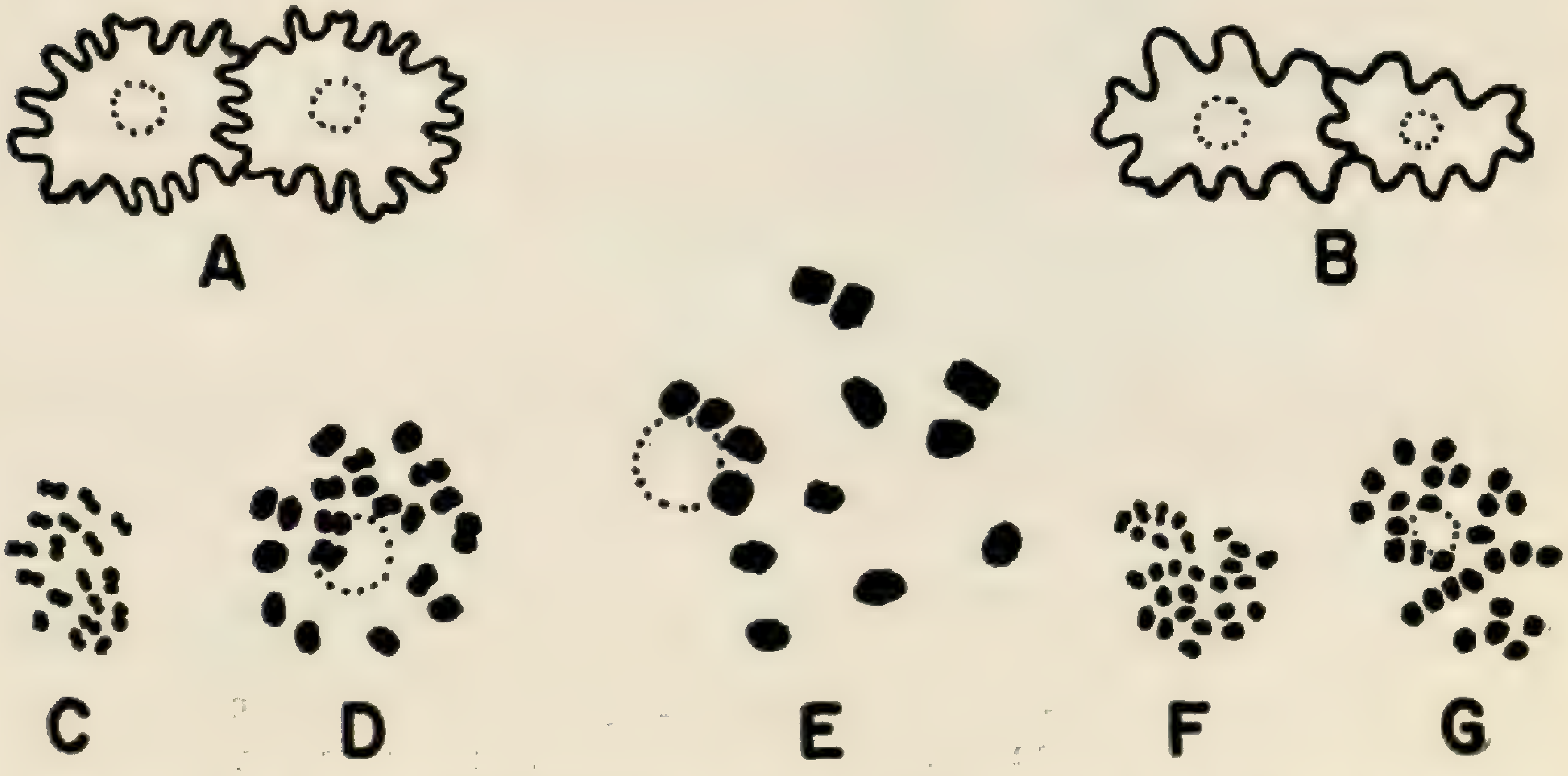


FIGURE 1. A. *S. fontinalis,* superficial view of achene epidermal cells showing configuration of inner walls. B. *S. lineatus,* superficial view of achene epidermal cells showing configuration of inner walls. C. *S. fontinalis,* metaphase I. D. *S. lineatus,* prophase I. E. *S. divaricatus,* prophase I. F. *S. ancistrochaetus,* metaphase I. G. *S. atrovirens,* prophase I.

---

description (Schuyler, 1962), are the following: Lehigh County: about ¼ mile N by slightly NW of W end of Slatedale, July 25, 1915, *H. W. Pretz 7698* (PH); Lehigh County: about ⅝ mile SW by S of Walbert's (R.R.) Station, July 10, 1921, *H. W. Pretz 10967* (PH); Lackawanna County: 2 mi. SSE of Scranton, Aug. 16, 1940, *S. L. Glowenke 4235* (PENN). Attempts by myself and Hans Wilkens, to relocate *S. ancistrochaetus* in the Lehigh County localities in the summer of 1963 were unsuccessful.

[4] I am grateful to Dr. W. Schultze-Motel for sending these photographs to me.

[5] Another Pennsylvania locality for this hybrid, not previously cited, is in Lackawanna County: ¾ mi. W of Fleetville, July 29, 1946, *S. L. Glowenke 8052* (PENN).

S. atrovirens var. *georgianus*[6] and the following information about what apparently he considered to be typical *S. atrovirens*, "No suitable figures of diakinesis were found, and the metaphase plates were often not clear, due to clumping. In most cases a large double chromosome is present, with a second one at times. The number cannot be established definitely with the material at hand. Varying counts have been made, from 25 to 30." A detailed study of specimens, resembling *S. ancistrochaetus, S. atrovirens,* and hybrids between them, collected in Windham County, Vermont (five miles north of Bellows Falls, adjacent to pool on east side of route 5), indicated that there is also considerable morphological variation in plants resembling these taxa.

Figure 2 diagrammatically shows the variation among plants collected at this Vermont locality. Specimens of all perceptible variants were collected and are represented in the diagram. The lengths of scales, achenes, and bristles were easy to measure and portray in the diagram. Moreover, the lengths of spikelets and the shapes of scales and bristle-teeth are also correlated with these measurements. The scale length represented for an individual specimen is the mean length of 5 scales from the middle portions of 5 spikelets. Achene length is the mean length of 5 achenes, and bristle length is the mean length of the longest bristles from 5 achenes. Percentage of seed production is the number of enlarged seeds observed in 100 fruits, divided by the potential number that could have been observed if each fruit contained one, and multiplied by one hundred.

As shown in figure 2, plants varied from those with long scales, bristles, and fruits (as in my *no. 3674*, PH) to those with short scales, bristles, and fruits (as in my *no. 3461*, PH). No enlarged seeds were found during an examination of over 600 fruits from specimens (my *nos. 3453 & 3682*, PH) represented by the five light circles with scales 1.6–1.7 mm. long in figure 2. Most pollen grains from these specimens were conspicuously distorted and did not stain internally with aceto-carmine. Also no enlarged seeds were found in fruits from the specimen (my *no. 3661*, PH) represented by the light circle on the left side of the diagram. This specimen likewise had conspicuously distorted pollen grains which did not stain internally with aceto-carmine. The rest of the specimens represented in the diagram had at least a few enlarged seeds, and their pollen grains were mostly undistorted (or only slightly distorted[7]) and did stain internally with aceto-carmine.

---

[6] I have not seen voucher specimens of the plants Hicks studied.

[7] Pollen grains of these plants are fragile and some apparent distortion is correlated with their stage of development and various methods of slide preparation. For this reason, it is difficult to use pollen distortion as a criterion of hybrid sterility, except in cases where it is especially pronounced.

The data presented here indicate that the plants studied at this locality belong to two variable taxa, *S. ancistrochaetus* and *S. atrovirens*, with highly sterile hybrids between them. The morphological variation and the variable seed production of plants belonging to each taxon suggests that some of them originated through introgression. Although the hybrids had large numbers of aborted pollen grains and seeds, it is possible that some of their pollen grains were functional and that backcrossing occurred with both parents. It is also possible, especially when one considers that thousands of flowers are present in a single inflorescence, that some seeds were produced (although none were observed) by the hybrid plants as a result of backcrossing.

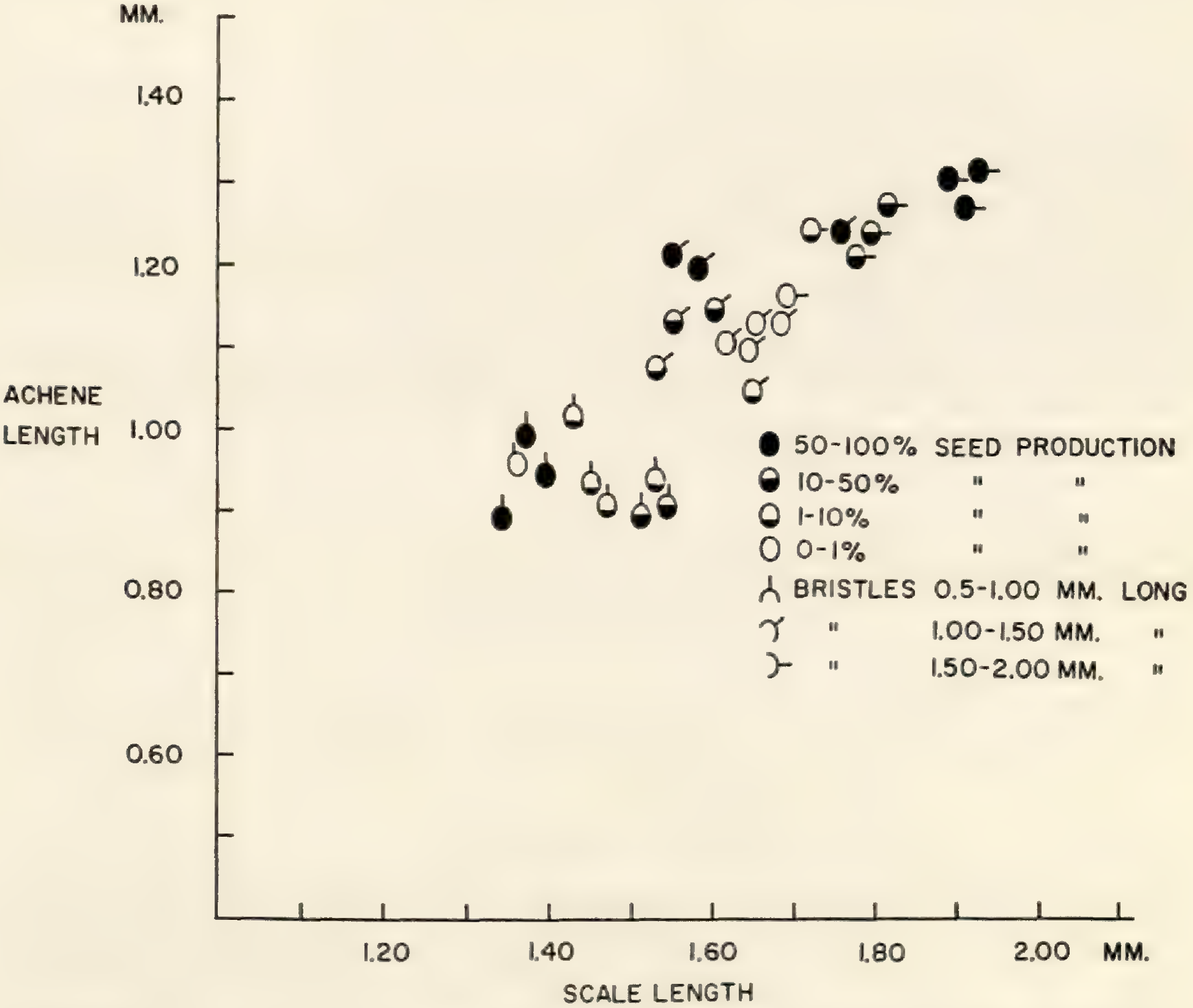


FIGURE 2. Scatter-diagram representing specimens collected at the locality in Windham County, Vermont.

TABLE 1. New chromosome observations in the genus *Scirpus*

Taxon	Number of meiotic units	Voucher specimen[a]
Scirpus divaricatus	14	NORTH CAROLINA: Pamlico Co.: *Schuyler 3554*
" "	"	FLORIDA: Jackson Co.: *Schuyler 3581*
Scirpus fontinalis	18	VIRGINIA: Surry Co.: *Schuyler 3529*
" "	"	NORTH CAROLINA: Onslow Co.: *Schuyler 3557*
Scirpus lineatus	20	MICHIGAN: Washtenaw Co.: *Schuyler 899*
" "	"	PENNSYLVANIA: Berks Co.: *Wilkens*
Scirpus ancistrochaetus	27	VERMONT: Windham Co.: *Schuyler 3602*
" "	"	PENNSYLVANIA: Clinton Co.: *Schuyler 3636*
Scirpus atrovirens	28	NEW YORK: Cattaraugus Co.: *Schuyler 3443*

[a] Specimens are in the herbarium of the Academy of Natural Sciences of Philadelphia.

ACKNOWLEDGMENTS

I wish to thank the curators of the herbaria where I visited or obtained loans and the following people who were helpful in various ways: Harry E. Ahles, Ernest O. Beal, Roger Clement, Andre F. Clewell, Francis Drouet, Robert K. Godfrey, Roland M. Harper, Peter A. Hyypio, Gearld D. Laulis, Albert E. Radford, Gus Tooke, Herbert A. Wahl, and Hans Wilkens. Also the payment of travel expenses by a grant from the Penrose Fund of the American Philosophical Society is gratefully acknowledged.

LITERATURE CITED

BEETLE, ALAN A. 1947. Scirpus. North American Flora 18: 481–504.

FERNALD, MERRITT L. 1950. Gray's Manual of Botany. 8th ed. American Book Co., New York, New York. lxiv & 1632 pp.

GLEASON, HENRY A. 1952. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. The New York Botanical Garden, New York, New York. 3 v.

HARPER, ROLAND A. 1903. Botanical Explorations in Georgia during the Summer of 1901.—II. Noteworthy Species. Bull. Torrey Bot. Club 30: 319–342.

HICKS, G. CLAUDE. 1928. Chromosome Studies in the Cyperaceae, with Special Reference to Scirpus. Bot. Gaz. 86: 295–317.

SCHUYLER, ALFRED E. 1962. A New Species of Scirpus in the Northeastern United States. Rhodora 64: 43–49.

Some Pennsylvania Barrens and Their Flora. I. Serpentine

EDGAR T. WHERRY

University of Pennsylvania

The past few numbers of *Bartonia* having dealt largely with New Jersey plants, it is time that Pennsylvania ones receive some attention. In an article "On Some Critical Species of the Serpentine Barrens" in No. 12, 1930, Dr. Francis W. Pennell summarized the characters of these areas in Pennsylvania, and his studies of their flora—which had been published in the *Proceedings of the Academy of Natural Sciences of Philadelphia* for 1910 and 1912. On page 3 he remarked that "Perhaps a future issue of *Bartonia* may reconsider the flora of the Serpentine Barrens with the fullness that the subject deserves." While this hope has not been fulfilled, since his early papers have long been out of print, a condensation of them is being published herewith. An opportunity has thereby been afforded to bring the nomenclature into accord with present-day usage.

The curious mineral name serpentine—becoming as a rock-name serpentinite—originated in northern Italy, where there lives on outcrops of it a species of snake matching its mottled green and brown color, an example of a phenomenon which enables an organism to avoid detection by its enemies or its prey. This mineral is a hydrous magnesium silicate, containing moderate amounts of other metallic elements, notably iron, nickel, and chromium. Serpentinite outcrops here and there in many parts of the world, and commonly supports vegetation differing in aspect from that of surrounding formations, notably as to sparsity, xeromorphism, and endemism; attempts to grow ordinary agricultural crops upon it are largely unsuccessful. These attributes of barrenness have been variously interpreted as due to shallowness of soil, presence of excessive amounts of the relatively toxic elements magnesium, nickel, and chromium, or deficiency of the nutrients calcium, potassium and phosphorus. Whatever the explanation, serpentinite or, for short, serpentine barrens are botanically fascinating places.

The soil of the serpentine barrens, known technically as Conowingo in reference to the valley of that name in Cecil County, Maryland, ranges from greenish gray where vegetation is sparse to black where a close grass cover has developed. The Barrens dot the Piedmont Plateau like islands in a sea of other rocks, and in his 1912 paper Pennell published a list of them with the latitudes and longitudes. They were then mostly undisturbed, but in subsequent years real estate operators found that their land could be bought up cheaply, and by now only suburban dwellings and their flora can be seen on many former barrens.

There are, fortunately a few notable exceptions: Middletown Barren, locally known as Pink Hill, preserved in the Tyler Arboretum (though threatened with destruction by suckering locust trees). Unionville Barren, located 1½ miles northeast of that village, a large tract of which has been received as a gift from her father by Mrs. Edward B. Leisenring, Jr., who plans to keep it in the family as a Nature Sanctuary—welcome news announced on the occasion of a field trip there by the Philadelphia Botanical Club on April 27, 1963. And some portions of the vast State Line Barren, in both Pennsylvania and Maryland, scarcely suitable for suburbanization, although considerably damaged by Japanese honeysuckle.

Plants of the Serpentine Barrens

The following list is based on the articles by Pennell above referred to. As in them, the plant families concerned are taken up in the standard systematic sequence; in the interest of ease of reference, however, the genera and species are now arranged under them alphabetically. Those especially well-developed on the Barrens are designated by an asterisk (*); those considered mere chance invaders are enclosed in brackets [ ]. The nomenclature is primarily that of Gray's Manual, edition 8, 1950, but alternative names used in Britton & Brown's Illustrated Flora, edition 3, 1952, or other current works are added in parentheses.

Lycopodiaceae: [*Lycopodium complanatum* var. *flabelliforme* (*L. flabelliforme*)].

Equisetaceae: [*Equisetum sylvaticum*].

Ophioglossaceae: [*Botrychium dissectum* f. *obliquum* (*B. obliquum*)].

Osmundaceae: [*Osmunda regalis* var. *spectabilis*].

Polypodiaceae: [*Adiantum pedatum*, *dwarf form, State Line Barren]; *Asplenium platyneuron;* [*Athyrium filix-femina* var. *michauxii* (*A. angustum*)]; *Dennstaedtia punctilobula;* [*Dryopteris* (*Thelypteris* or *Phegopteris*) *hexagonoptera*], [*D. marginalis*], [*D.* (*Thelypteris*) *noveboracensis*]; *Polystichum acrostichoides; Pteridium aquilinum* var. *latiusculum.*

Pinaceae: *Juniperus virginiana; Pinus rigida, P. virginiana.*

Typhaceae: [*Typha angustifolia, T. latifolia*].

Gramineae: *Agrostis hyemalis*, including *A. antecedens, A. perennans; Andropogon gerardi, A. scoparius,* [*A. virginicus*]; [*Anthoxanthum odoratum*]; *Aristida dichotoma, A. longespica, A. oligantha, A. purpurascens; *Bouteloua curtipendula; Danthonia spicata; *Deschampsia caespitosa; Digitaria filiformis,* [*D. ischaemum*]; *Eragrostis pectinacea,* [*E. pilosa*]; [*Festuca octoflora* var. *tenella*]; *Glyceria striata; Leersia oryzoides, L. virginica; Muhlenbergia mexicana, M. sylvatica; Panicum anceps, P.* **annulum, P. boscii* var. *molle,* [*P.*

capillare], *P. clandestinum*, [*P. commonsianum*, type and var. *addisonii*], *P. depauperatum*, *P. dichotomiflorum*, *P. dichotomum*, type and var. *barbulatum*, [*P. gattingeri*], *P. lanuginosum*, type, var. *fasciculatum*, incl. *huachucae* [and *tennesseensis*], and [var. *lindheimeri*], [*P. linearifolium*], [*P. meridionale*], [*P. microcarpon*], *P. oligosanthes* var. *scribnerianum*, *P. philadelphicum*, *P. sphaerocarpon*, *P. villosissimum*, [*P. virgatum*]; *Paspalum ciliatifolium* var. *muhlenbergii*, *P. laeve* [var. *circulare*] and var. *pilosum;* [*Poa pratensis*]; [*Setaria faberi*, *S. geniculata*]; *Sorghastrum nutans; Sphenopholis obtusata*, type and var. *pubescens; Sporobolus* **heterolepis*, *S. vaginiflorus; Triodia flava* f. *purpurea*.

CYPERACEAE: [*Bulbostylis capillaris* var. *crebra*]; *Carex abdita*, *C. annectens*, *C.* **bicknellii*, [*C. cephalophora*], *C. bushii*, *C. echinata*, *C. flaccosperma*, type and var. *glaucodea*, [*C. granularis*], *C. hirsutella* (*C. complanata* var. *hirsuta*), *C. hystricina*, *C. incomperta*, *C. interior*, *C. lanuginosa*, [*C. laxiculmis*], *C. lurida*, [*C. muhlenbergii*, *C. nigromarginata*], *C. normalis*, *C. pensylvanica*, *C. retroflexa* [*C. rosea*], *C. scoparia*, [*C. stipata*], *C. straminea*, *C. stricta*, [*C. vestita*], *C. vulpinoidea*, *C. willdenowii; Cyperus inflexus*, *C. filiculmis* var. *macilentus*, [*C. rivularis*], *C. strigosus;* [*Dulichium arundinaceum*]; *Eleocharis* [*calva*, *E. palustris*], *E. tenuis; Fimbristylis* **baldwiniana* (*F. annua*); *Rhynchospora glomerata*, type and var. *minor* forma *controversa; Scirpus atrovirens*, [*S. cyperinus*, *S. validus*]; *Scleria pauciflora*, type and *var. *caroliniana*, *S. triglomerata*.

COMMELINACEAE: [*Tradescantia virginiana*].

JUNCACEAE: *Juncus acuminatus*, *J. biflorus*, *J. dichotomus*, *J. effusus*, *J. marginatus*, *J. platyphyllus*, *J. secundus*, *J. tenuis; Luzula bulbosa*, *L. campestris*.

LILIACEAE: *Aletris farinosa;* [*Chamaelirium luteum*]; *Lilium philadelphicum;* [*Polygonatum canaliculatum*]; *Smilacina racemosa; Smilax glauca*, *S. herbacea*, type and *ssp. *crispifolia*, *S. rotundifolia;* [*Uvularia perfoliata*].

AMARYLLIDACEAE: [*Hypoxis hirsuta*].

IRIDACEAE: *Sisyrinchium* [*angustifolium*], *S. mucronatum*.

ORCHIDACEAE: [*Goodyera pubescens*]; [*Habenaria flava*]; *Liparis liliifolia*, *L. loeselii;* [*Malaxis unifolia*]; *Spiranthes gracilis*, [*S. tuberosa*].

SALICACEAE: *Populus grandidentata; Salix humilis*, type and var. *microphylla* (*S. tristis*).

MYRICACEAE: *Comptonia peregrina* (*Myrica asplenifolia*).

CORYLACEAE (BETULACEAE): *Alnus serrulata;* [*Carpinus caroliniana* var. *virginiana*]; *Corylus americana*.

FAGACEAE: *Castanea dentata; Quercus alba*, *Q.* × **bushii*, *Q. ilicifolia*, *Q. marilandica*, *Q. palustris*, *Q. prinoides*, *Q. prinus*, *Q. stellata*, [*Q. rubra*, *Q. velutina*].

URTICACEAE: [*Boehmeria cylindrica*].

SANTALACEAE: *Comandra umbellata*.

POLYGONACEAE: *Polygonum* [*arifolium* var. *pubescens*, *P. sagittatum*, *P. scandens*], *P. tenue*.

PORTULACCACEAE: **Talinum teretifolium.*

CARYOPHYLLACEAE: *Arenaria* [*serpyllifolia*], *A.* **stricta; Cerastium arvense* *var. *villosissimum,* *var. *villosum; Silene stellata.*

RANUNCULACEAE: *Anemonella thalictroides; Thalictrum revolutum.*

LAURACEAE: [*Lindera benzoin*]; *Sassafras albidum.*

CRUCIFERAE: *Arabis lyrata.*

SAXIFRAGACEAE: *Saxifraga virginiensis.*

ROSACEAE: [*Amelanchier arborea, A. laevis*]; *Potentilla canadensis;* [*Prunus americana*]; *Pyrus* [*coronaria*], *P. melanocarpa* (*Aronia nigra*); *Rosa carolina; Rubus* [*argutus*], *R. flagellaris, R. frondosus* (*pensilvanicus*), [*R. occidentalis*]; *Sanguisorba canadensis; Spiraea latifolia.*

LEGUMINOSAE (CAESALPINIACEAE and FABACEAE): [*Amphicarpa bracteata* var. *comosa*]; *Baptisia tinctoria; Cassia chamaecrista* (*fasciculata*), *C. nictitans; Crotalaria sagittalis; Desmodium ciliare; D. marilandicum, D. paniculatum, D. perplexum* (*dillenii*), *D. rigidum; Lespedeza capitata, L. hirta, L. intermedia, L. nuttallii, L. procumbens, L. repens, L. virginica; Strophostyles umbellata; Stylosanthes biflora;* [*Tephrosia virginiana*].

LINACEAE: *Linum floridanum, L. intercursum, L. medium* var. *texanum, L. virginianum.*

OXALIDACEAE: [*Oxalis stricta, O. violacea*].

GERANIACEAE: [*Geranium maculatum*].

POLYGALACEAE: *Polygala sanguinea,* [*P. senega*], *P. verticillata* var. *ambigua* (*P. ambigua*).

EUPHORBIACEAE: [*Euphorbia corollata, E. maculata* (*preslii*), *E. supina* (*maculata*)].

ANACARDIACEAE: *Rhus copallina* var. *latifolia, R. glabra,* [*R. radicans, R. typhina*].

CELASTRACEAE: [*Celastrus scandens*].

ACERACEAE: *Acer rubrum.*

BALSAMINACEAE: *Impatiens capensis* (*biflora*).

RHAMNACEAE: *Ceanothus americanus.*

VITACEAE: *Vitis aestivalis.*

HYPERICACEAE: *Ascyrum hypericoides; Hypericum gentianoides, H. punctatum.*

CISTACEAE: *Helianthemum bicknellii* (*majus*); *Lechea leggettii, L. minor, L. racemulosa.*

VIOLACEAE: *Viola* [*conspersa, V. emarginata, V. palmata*], *V. pedata* var. *lineariloba, V. sagittata* (pubescent state).

LYTHRACEAE: [*Cuphea petiolata*].

NYSSACEAE: *Nyssa sylvatica.*

ONAGRACEAE: [*Epilobium angustifolium*]; *Oenothera fruticosa,* type and var. *linearis.*

UMBELLIFERAE: *Angelica venenosa;* [*Cicuta maculata*]; [*Sanicula marilandica*]; *Zizia aptera, Z. aurea.*

CORNACEAE: [*Cornus alternifolia*].

PYROLACEAE: (ERICACEAE, part): [*Chimaphila maculata, C. umbellata* var. *cisatlantica; Pyrola elliptica, P. rotundifolia* var. *americana*].

ERICACEAE: [*Epigaea repens*]; *Gaylussacia baccata;* [*Kalmia latifolia*]; *Lyonia ligustrina, L. mariana; Rhododendron nudiflorum,* type and var. *glandiferum,* [*R. viscosum* var. *glaucum*]; *Vaccinium angustifolium, V. atrococcum, V. caesariense,* [*V. caesium, V. corymbosum*], *V. stamineum,* type and var. *neglectum* (*V. neglectum*), *V. vacillans,* type and var. *crinitum.*

PRIMULACEAE: *Lysimachia quadrifolia.*

EBENACEAE: *Diospyros virginiana.*

GENTIANACEAE: *Gentiana crinita, G. villosa; Sabatia angularis.*

APOCYNACEAE: [*Apocynum medium*].

ASCLEPIADACEAE: *Asclepias purpurascens,* [*A. syriaca*], *A. *verticillata, A. viridiflora* (*Acerates viridiflora*).

CONVOLVULACEAE: [*Convolvulus spithamaeus*].

POLEMONIACEAE: *Phlox* [*pilosa*], *P. *subulata.*

LABIATAE: [*Cunila origanoides*], *Prunella vulgaris* var. *lanceolata; Pycnanthemum tenuifolium* (*P. flexuosum*); *Scutellaria* [*elliptica, S. integrifolia*], *S. parviflora* var. *leonardi* (*S. leonardi*); [*Trichostema dichotomum*].

SCROPHULARIACEAE: [*Castilleia coccinea; Chelone glabra*]; *Gerardia* [*flava* (*Aureolaria flava*)], *G. paupercula* (*G. purpurea* var. *parviflora*), *G. pedicularia* (*Aureolaria pedicularia*), *G. tenuifolia; Veronicastrum virginicum.*

RUBIACEAE: *Galium* [*asprellum*], *G. boreale, G. pilosum,* [*G. tinctorium, G. triflorum*]; *Houstonia caerulea; Mitchella repens.*

CAPRIFOLIACEAE: *Lonicera* [*japonica*], *L. sempervirens;* [*Sambucus canadensis*]; *Viburnum prunifolium.*

LOBELIACEAE: *Lobelia spicata.*

COMPOSITAE: *Ambrosia artemisiifolia; Antennaria neglecta, A. neodioica* (*A. neglecta* var. *attenuata*), *A. plantaginifolia; Aster* [*cordifolius*], *A. *depauperatus, A. dumosus, A. laevis, A. lateriflorus, A. patens, A. pilosus* var. *demotus,* [*A. puniceus*], *A. undulatus; Cirsium discolor, C. muticum, C.* [*odoratum* (*C. pumilum*)]; [*Erechtites hieracifolia*]; *Eupatorium aromaticum, E. perfoliatum, E. pubescens* (*E. rotundifolium* var. *ovatum*), [*E. purpureum*]; *Gnaphalium obtusifolium; Helianthus divaricatus, H. giganteus; Heliopsis helianthoides; Hieracium gronovii, H. venosum;* [*Krigia virginica*]; [*Lactuca biennis*]; *Liatris spicata; Prenanthes* [*alba*], *P. serpentaria; Senecio smallii; Sericocarpus asteroides* (*Aster paternus*); *Solidago altissima, S. bicolor, S. caesia, S. graminifolia* var. *nuttallii, S. juncea, S. nemoralis, S. rugosa,* type and var. *aspera; Vernonia glauca, V. noveboracensis.*

Robert Hirst, Nov. 5, 1925–Sept. 27, 1963

The recent passing away of Bob Hirst, a self-taught naturalist, is mourned by our members who were associated with him in the exploration of the New Jersey Flora. With his brother Frank he roamed the undisturbed lands of the State from his early teens. His well-worn copy of Gray's Manual had the colloquial-name index removed, so that he would be sure to learn the scientific nomenclature.

Several members of the Philadelphia Botanical Club, notably Bayard Long, Louis Hand, and the late David Fables, admired Bob's enthusiasm and aided him in his studies. Mr. Long was especially close to him because of mutual interest in the plants of the Pine Barrens, and Bob and his brother were often seen in the local herbarium of the Academy, deep in discussion over the identity of some puzzling plant.

The Hirst brothers were responsible for the relocation of a number of "lost plants" of New Jersey, and the finding of several species not previously known this far north. References to these activities have been published in some recent issues of Bartonia: "Goose Pond Saved," No. 29, p. 2; "Caesarian Flora and Fauna, No. 4, Additions to the Flora . . . ," No. 32, p. 11.

In Rhodora, Vol. 63, No. 752, Jason R. Swallen of the Div. of Botany, Smithsonian Institution, described a new species of grass, *Panicum hirstii*, named for Frank Hirst. It was a disappointment and embarrassment to Frank that the species name was not in the plural, for the discovery and work on this grass was shared by the devoted brothers, but it was characteristic of Bob's modesty that this oversight did not disturb him at all.

A hard-working member of the Pine Barren Conservationists, he also shared the responsibility, with Frank, as curator of the developing herbarium to be established at Batsto. He will be greatly missed by the many who valued his cheerful, kindly, and extremely helpful friendship. Bob always gave of his knowledge generously and was a wonderful field companion.

He is survived by his wife, Ruth; son, Robert; brother and parents.—D. S. E.

More Orchid Vandalism in New Jersey

A year ago there was published in the Bulletin of the Torrey Botanical Club an article on the plants of two depressions in New Jersey, a bog near Uttertown and the group of meadows known as Bennett Bog. The treatment of the latter was disappointing, in that about the only "new" information comprised the claim that it is "sphagnous"—which, where the rarer species grow, it is not—and that *Chrysanthemum leucanthemum* and *Waldsteinia fragarioides* (a manifest misidentification) occur there. Anyway, it emphasized the abundance of the Snowy Orchid, *Habenaria nivea*.

In late August, among the grasses of the depression one enters first, a hundred or so plants of this were gaily blooming. On a visit in late September, a hundred holes were found there instead. In one of these, ironically directly in front of the large sign proclaiming the area to be a nature sanctuary, the digger had left behind a trowel—and an expensive one at that. What can one say of the effrontery of a person who would thus treat an area which had been purchased and set aside in the hope of permanent preservation of a unique botanical area?

A few miles away the local naturalists Norman and Lorene McDonald had bought a house with adjoining woodland, in which the largest known New Jersey colony of Crane-fly Orchid, *Tipularia discolor,* was growing. Alas, the exact location of this got published in a Bulletin of the Cape May Geographic Society. In the summer of 1963, when the time for its blooming came, the McDonalds invited a nature photographer down to get pictures of it. But he didn't get a single one, every plant in sight having been dug up and hauled away.

So neither public nor private sanctuaries are now safe from large-scale vandalism, and about all naturalists can do about it is to refrain from publishing the locations of colonies of rare plants.—P. B. C. Conservation Committee.

Philadelphia Botanical Club Records, 1963

Program of Meetings

Date	*Subject*	*Speaker*	*Attendance*
Jan. 24	The Growth of an Alga	Dr. Paul Green	27
Feb. 28	Botanical Sources of Mexican Amber	Dr. Jean Langenheim	44
Mar. 28	Biological Opportunities in Costa Rica	Dr. L. G. Livingston	36
Apr. 25	Scandinavia and the Low Countries	Dr. John M. Fogg, Jr.	49
May 23	Poisonous Vascular Plants of the Philadelphia Area	Dr. Lawrence J. King	37
Sept. 27	Reports by Members of Summer Activities		31
Oct. 24	Early Summer Flowers of Ireland	Dr. Robert B. Gordon and Dr. Ralph M. Sargent	54
Nov. 21	Summer Plants of Beartooth Area of Wyoming and Montana	James R. McGrath	33
Dec. 19	Recent Studies in the Phlox Family	Dr. Edgar T. Wherry	42

Trips

Date	*Locality*	*Leaders*	*Attendance*
Apr. 27	Unionville Serpentine Barrens	Dr. Robert B. Gordon and Dr. Edgar T. Wherry	29
June 29	Summer Flowers of the Pine Barrens	Mrs. W. Brooks Evert and Dr. Edgar T. Wherry	30

Officers and Members, 1963

Dr. Edgar T. Wherry, *Honorary President*

Hugh E. Stone and Harry W. Trudell, *Honorary Vice Presidents*

Dr. Walter M. Benner, *President*
Dr. Ralph M. Sargent, *Vice President*
Mrs. Robert Robertson, *Secretary*
William L. Freyburger, *Treasurer*
Bayard Long, *Curator*
Dr. Edgar T. Wherry, *Editor*

ACTIVE MEMBERS (as of December 31, 1963)

	Elected
Mrs. C. J. Allen, Jr., Woodside Lane, Riverton, N. J.	1957
Richard R. Anderson, 49 Hubbard Ave., Red Bank, N. J.	1963
Mrs. F. E. Atkins, 3422 Queen Lane, Philadelphia 29, Pa.	1953
Mrs. A. C. Barnes, Box 128, Merion Station, Pa.	1942
Edwin B. Bartram, Bushkill, Pa.	1906
Mrs. Winthrop H. Battles, Providence Rd., Media, Pa.	1962
Dr. Walter M. Benner, 5636 Loretta Ave., Philadelphia 24, Pa.	1912
Dr. David Berkheimer, Limekiln, Berks Co., Pa.	1943
Mrs. Roscoe Bowers, Braddocks Mill Lake, Marlton, N. J.	1963
Mrs. Robert A. Bradel, 900 Overton Ave., Morrisville, Bucks Co., Pa.	1963
William C. Brumbach, 850-D Berkshire Drive, Reading, Pa.	1943
Miss Margaret Butler, 4598 Castor Ave., Philadelphia 24, Pa.	1953
Richard B. Chillas, 233 Winona Ave., Philadelphia 44, Pa.	1942
Miss Carola S. Collings, 1728 Pine St., Philadelphia 3, Pa.	1954
Louis Cordivari, 222 N. Gross St., Philadelphia 39, Pa.	1962
Mrs. Alan Crawford, White House Rd., Devon, Pa.	1962
W. L. Dix, 801 Crown St., Morrisville, Pa.	1942
Albert Donaghy, Jr., R. D. 1, Pottstown, Pa.	1952
Dr. Francis Drouet, Academy of Natural Sciences, Philadelphia 3, Pa.	1961
Miss Elizabeth C. Earle, 132 Carlton Place, Media, Pa.	1935
Mrs. Nellie Erisman, 5408-1A Bartram Drive, Philadelphia 43, Pa.	1945
Mrs. Harold Evans, Awbury, E. Washington Lane, Philadelphia 38, Pa.	1931
Mrs. W. Brooks Evert, 430 Thomas Ave., Riverton, N. J.	1957
Carl W. Fenninger, 8304 Stenton Ave., Philadelphia 18, Pa.	1947
Miss Elizabeth H. Flavell, 6146 Wayne Ave., Philadelphia 44, Pa.	1946
Sister M. Flaventia, Holy Family College, Torresdale, Philadelphia 14, Pa.	1958
Dr. John M. Fogg, Jr., 6807 Quincy St., Philadelphia 19, Pa.	1921
Mrs. John M. Fogg, Jr., 6807 Quincy St., Philadelphia 19, Pa.	1961
William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa.	1956
Mrs. William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa.	1956
Miss Julia Frick, Latches Lane, Merion Station, Pa.	1963
John Gill, Box 1115, R. D. 1, Brown's Mills, N. J.	1939
Dr. Thomas S. Githens, Cambridge Apts., Philadelphia 44, Pa.	1945
Dr. Robert B. Gordon, 415 Sharpless St., West Chester, Pa.	1942
Mrs. Robert B. Gordon, 415 Sharpless St., West Chester, Pa.	1962
John F. Gyer, Jessup Mill Rd., Clarksboro, N. J.	1960

	Elected
Louis E. Hand, Box 146, New Lisbon, N. J.	1936
Mrs. J. Norman Henry, Gladwyne, Pa.	1932
Miss Josephine de N. Henry, Gladwyne, Pa.	1938
J. Norman Henry, Jr., 410 Mulberry Lane, Haverford, Pa.	1956
R. L. Hill, Jr., 180 Drexel Ave., Lansdowne, Pa.	1963
Mrs. R. L. Hill, Jr., 180 Drexel Ave., Lansdowne, Pa.	1963
A. H. Holcombe, Jr., 1330 Youngs Ford Rd., Gladwyne, Pa.	1949
Mrs. A. H. Holcombe, Jr., 1330 Youngs Ford Rd., Gladwyne, Pa.	1949
Mrs. John M. Huebner, 150 Anton Rd., Wynnewood, Pa.	1958
Mrs. M. L. Kendig, 65 S. Main St., Manheim, Pa.	1935
Robert L. Kendig, 67 County Line Rd., Huntingdon Valley, Pa.	1955
Miss Natalie B. Kimber, 538 E. Locust Ave., Philadelphia 44, Pa.	1928
Dr. Lawrence J. King, Philadelphia College of Pharmacy and Science, 43rd and Kingsessing Ave., Philadelphia 4, Pa.	1963
Ludwig A. Koelnau, 850 N. 22nd St., Philadelphia 3, Pa.	1952
Mrs. Ida K. Langman, 248 Harvey St., Philadelphia 44, Pa.	1937
Dr. Hui-Lin Li, Morris Arboretum, Philadelphia 18, Pa.	1944
Dr. Harry A. Lloyd, 200 N. 35th St., Philadelphia 4, Pa.	1931
Bayard Long, 250 Ashbourne Rd., Elkins Park, Philadelphia 17, Pa.	1906
Mrs. C. P. Mann, 905 Cherry Lane, Riverton, N. J.	1957
Sidney Margolis, 1221 Wingohocking St., Philadelphia 40, Pa.	1962
Mrs. Alfred Martin, Three Tuns, Ambler RD 3, Ambler, Pa.	1961
James R. McGrath, 56 Whartman Rd., Graterford, Pa.	1961
Mrs. Charles J. McKinney, 233 Rex Ave., Philadelphia 18, Pa.	1961
Dr. Tilford D. Miller, 215 King Ave., Westmont 7, N. J.	1962
Mrs. Tilford D. Miller, 215 King Ave., Westmont 7, N. J.	1962
Miss Julia Moore, Mill Creek Rd., Chalfont, Pa.	1963
Dr. Edwin T. Moul, Dept. of Botany, Rutgers University, New Brunswick, N. J.	1945
A. Edward Murray, Jr., 70 Kraft Lane, Kenwood, Levittown, Pa.	1960
Raymond J. Nelson III, 225 Weymouth Rd., Darby, Pa.	1961
Mrs. Edward Norman, 22 Pin Oak Drive, Lawrence Twp., Trenton, N. J.	1961
Mrs. George P. Orr, Williow Brook Farm, Paoli, Pa.	1935
Miss Elizabeth Orsatti, 7238 N. 20th St., Philadelphia 38, Pa.	1962
Walter Palmer, Route 35, Media, Pa.	1952
Mrs. Frank Parker, 400 S. 45th St., Philadelphia 4, Pa.	1950
Dr. Ruth Patrick, P. O. Box 4095, Chestnut Hill Sta., Philadelphia 18, Pa.	1937
Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
Dr. Charles W. Reimer, 856 Cricket Rd., Secane, Pa.	1953
Dr. Cecilia Riegel, B502 Merion Gardens, Merion, Pa.	1957
Dr. Robert Robbins, Temple University, Dept. of Radiology, Philadelphia 40, Pa.	1954
Dr. Robert Robertson, 508 S. 41st St., Philadelphia 4, Pa.	1960
Mrs. Robert Robertson, 508 S. 41st St., Philadelphia 4, Pa.	1960
Mrs. Philip Q. Roche, Harts Lane, Miquon, Pa.	1953
Miss Anne Rowland, 1276 Welsh Rd., Meadowbrook, Pa.	1948
Mrs. Karl Rugart, 612 Bryn Mawr Ave., Penn Valley, Narberth, Pa.	1942
Dr. Ralph M. Sargent, 4 College Circle, Haverford, Pa.	1948
Mrs. Ralph M. Sargent, 4 College Circle, Haverford, Pa.	1962

	Elected
Dr. Robert L. Schaeffer, Jr., 30 N. 8th St., Allentown, Pa.	1938
Dr. Alfred E. Schuyler, Academy of Natural Sciences, Philadelphia 3, Pa.	1962
Miss Dorothy Scott, 2359 E. Cumberland St., Philadelphia 25, Pa.	1959
Mrs. George R. Shaefer, 2976 Dorman Ave., Broomall, Pa.	1963
Henry Singer, 2655 Summit Ave., Broomall, Pa.	1963
Mrs. Walter Smedley, 409 Fairview Rd., Narberth, Pa.	1963
James R. Steel, Jr., 1503 Shoemaker Rd., Abington, Pa.	1961
Charles G. Stehle, 1714 Brook Rd., Rydal, Pa.	1963
Mrs. Charles G. Stehle, 1714 Brook Rd., Rydal, Pa.	1963
Dr. C. I. Stiteler, 507 Welsh St., Chester, Pa.	1945
Hugh E. Stone, White Hall Apts., Haverford, Pa.	1892
Mrs. George Stoops, Providence Rd., Media, Pa.	1960
Miss Mary Sullivan, Montgomery Court L 23, Narberth, Pa.	1954
Mrs. Edmond G. Thomas, 400 W. Springfield Ave., Philadelphia 18, Pa.	1963
Miss Elizabeth Thorp, 403 S. 41st St., Philadelphia 4, Pa.	1953
Robert J. Titherington, 6317 N. Norwood St., Philadelphia 38, Pa.	1942
Harry W. Trudell, 1309 Highland Ave., Abington, Pa.	1915
Mrs. J. H. Vance, 148 Montgomery Ave., Bala-Cynwyd, Pa.	1950
Charles H. Van Housen, 5022 Erringer Place, Philadelphia 44, Pa.	1954
Jesse T. Vogdes, N. Lemon St., Media, Pa.	1960
Mrs. Jesse T. Vogdes, N. Lemon St., Media, Pa.	1958
Dr. Paul R. Wagner, 789 Main St., Collegeville, Pa.	1935
E. Perot Walker, 3009 Park Rd., Lafayette Hills, Pa.	1939
Mrs. E. Perot Walker, 3009 Park Rd., Lafayette Hills, Pa.	1958
Albert J. Webb, 351 Oak Terrace, Wayne, Pa.	1959
Dr. Lily A. Weierbach, 5220 Wayne Ave., Philadelphia 44, Pa.	1958
Dr. Edgar T. Wherry, 228 Harvey St., Philadelphia 44, Pa.	1925
Hans Wilkens, 424 S. 15th St., Reading, Pa.	1928
David L. Williams, 801c S. 47th St., Philadelphia 43, Pa.	1963
Mrs. Richard D. Wood, Jr., Wawa, Pa.	1961
Mrs. James Woodford, Cedar Run Lake, Marlton, N. J.	1959
Mrs. H. Winfield Wright, 515 Folcroft Ave., Folcroft, Pa.	1959

CORRESPONDING MEMBERS

Dr. Theodor P. Haas, Rm. 124, Islander Hotel, 400 Seaside Ave., Waikiki, Hawaii	1946
Charles E. Mohr, Nature Center, Kalamazoo, Michigan	1959
Mrs. E. D. Rudolph, 300 West Lane, Columbus 1, Ohio	1961
Dr. Harold St. John, Box 33, A.P.O. 143, San Francisco, Calif.	1927
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich.	1921
Dr. Heber W. Youngken, Massachusetts College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

Mrs. John F. Gall	May 6, 1963
Miss Elizabeth H. Lewis	October 15, 1963
Dr. Frederick M. Oldach	March 11, 1963
William H. Witte	December 1, 1963

No. 34 1964

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

CONTENTS

Harry W. Trudell .... EDGAR T. WHERRY 1

Hugh E. Stone .... RALPH M. SARGENT 3

Notable Plants of Northeasternmost Pennsylvania .... W. L. DIX 5

The Most Disjunct Species in Pennsylvania .... EDGAR T. WHERRY 7

Some Pennsylvania Barrens and Their Flora. II. .... EDGAR T. WHERRY 8

A Medal Is Awarded 12

Notes and News 15

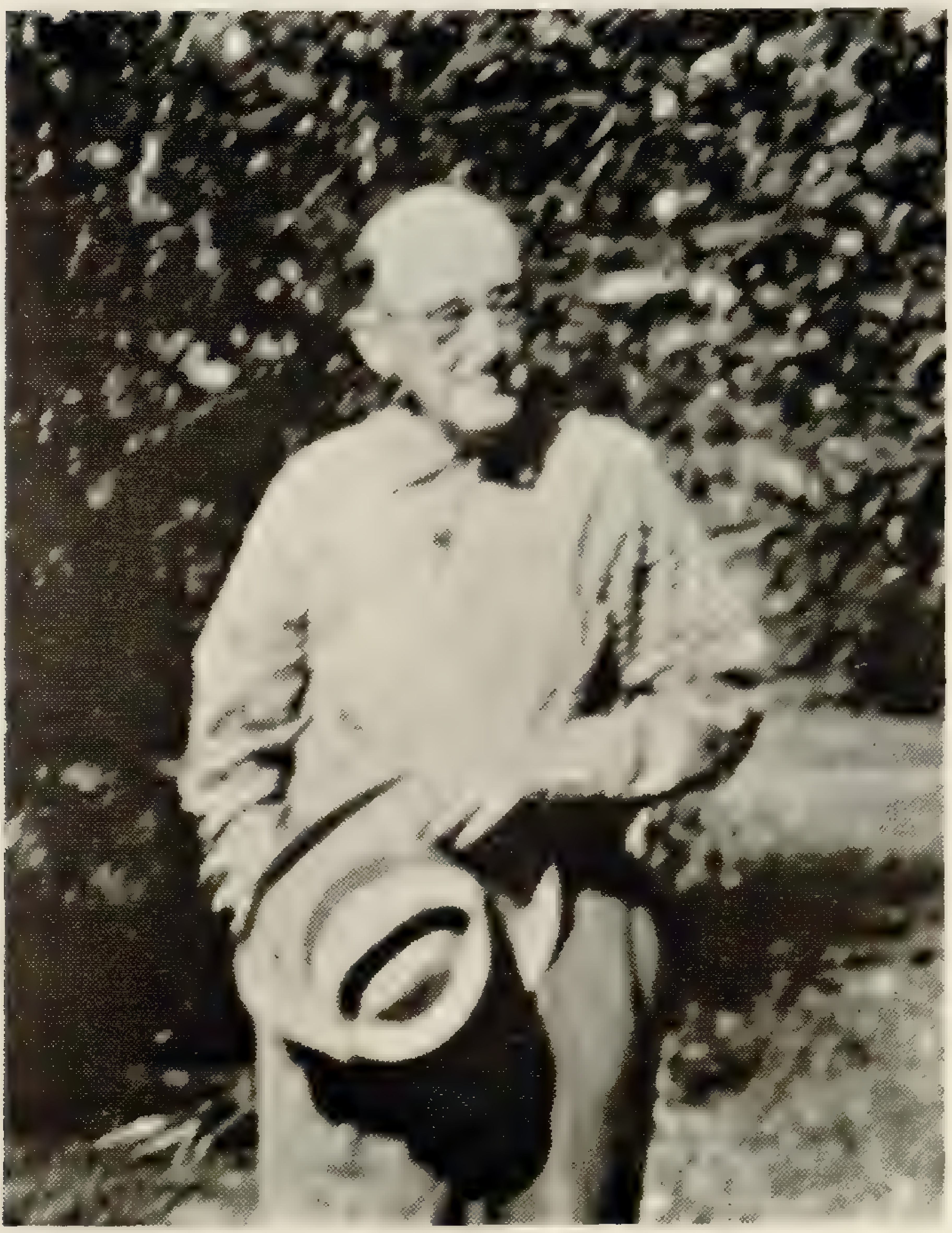
Philadelphia Botanical Club Records, 1964 16

PUBLISHED BY THE CLUB
ACADEMY OF NATURAL SCIENCES, 19TH & PARKWAY
PHILADELPHIA, PENNSYLVANIA 19103
Subscription Price, $1.00. Back Numbers, $1.00 each
Issued April 2, 1965

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

No. 34 1964



Harry W. Trudell, 1879–1964

Early in 1964 the Philadelphia Botanical Club lost one of its most active, widely known, and beloved members, and will never be quite the same again.

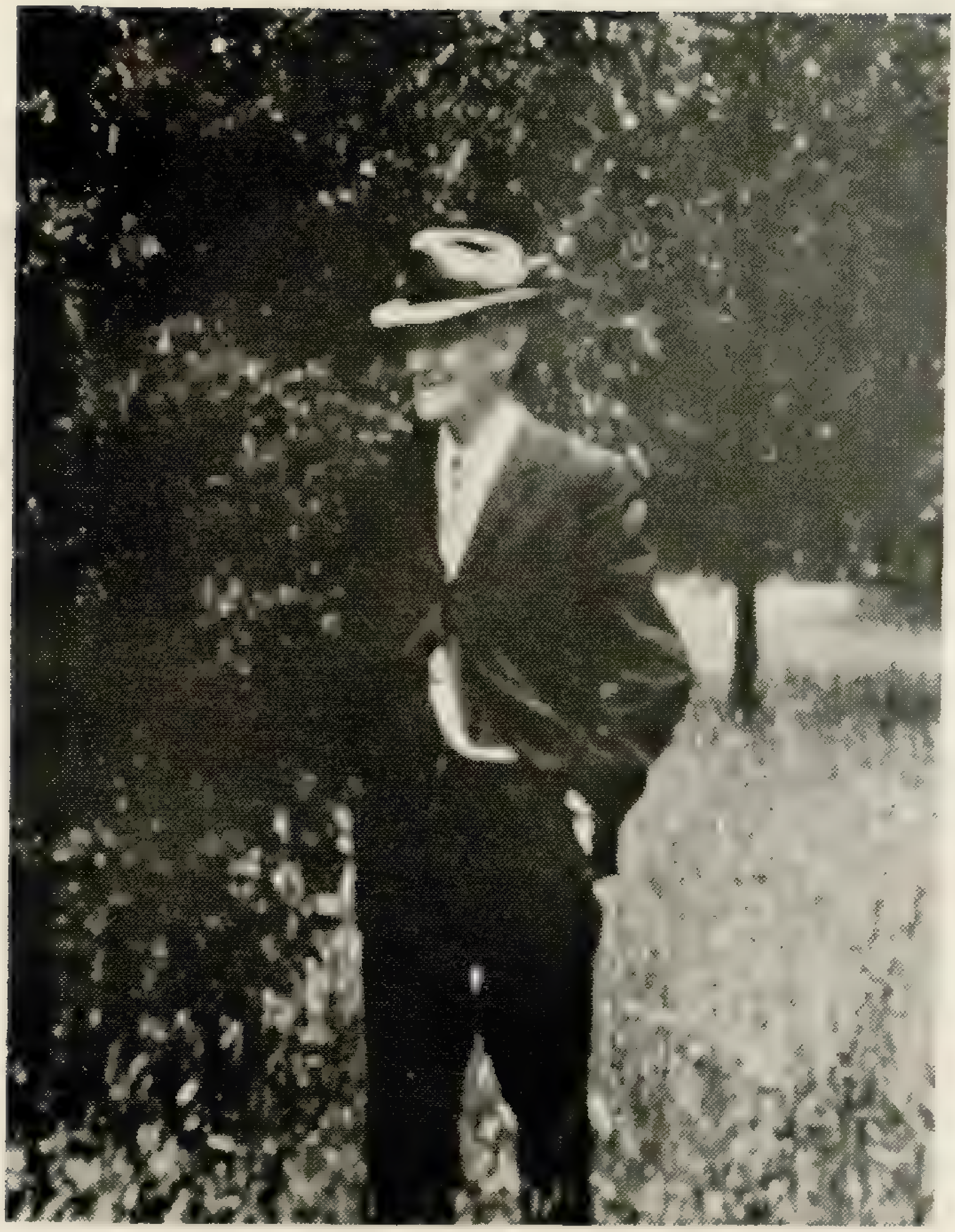
Harry W[illiam]. Trudell was born in Richmond, Virginia, May 2, 1879, and came to Philadelphia in the 1890's. He became an accountant, and was employed by the leather firm, Foerderer & Co., widely known as the developer of "Vici Kid." For years he was their chief purchasing agent, and ultimately became Secretary. When in 1940 the firm disbanded he was left without a job, but having saved money over the years, was able to live comfortably. He never married, but lived at the home of a sister, Mrs. George Tongue, in Frankford and subsequently on Highland Ave. in Abington, Montgomery County. A most congenial person, with a delightful sense of humor, he had a host of friends in various walks of life, and was for years the writer's favorite field companion.

Ever a lover of the outdoors, Harry became an active amateur botanist and mineralogist, taking part in frequent collecting trips. He built a small cabin on the marshes of Pensauken Creek east of Moorestown, New Jersey—what else could it be named but *Domus palustris!*—and many a local naturalist recalls with pleasure week-ends spent there. Around 1920 when the writer was carrying on studies of soil acidity relationships for the U. S. Department of Agriculture, Harry was able to take vacations and join in trips as far north as Mt. Washington, New Hampshire and as far south as Savannah, Georgia. When having to go far from the beaten track we would sleep out, and Harry always had rice and raisins in his pack to make us a satisfying evening meal. He also recorded in short-hand our itinerary and the plants we found. It was a pleasure to be able to name in his honor a fern we came upon on the Susquehanna cliffs in Lancaster Co., Pa., *Asplenium trudelli*. While disinclined to write for publication, he did record "Rescuing Elliottia" in *Bartonia* No. 9, p. 11, 1926, and "A New Locality of Elliottia" in No. 10, p. 24, 1929.

Joining the Philadelphia Botanical Club in 1915, Harry rarely missed a meeting. He was elected President in 1924, Secretary in 1927, and Vice President 1932 to 1945. In 1947 he was made Treasurer, and kept most careful watch over our financial affairs until ill health forced his withdrawal in 1960; thereafter he was designated an Honorary Vice President. He was one of the original members of the Southern Appalachian Botanical Club, and for over 40 years a member of the American Fern Society. He also took an active part in many local mineralogical and natural history societies.

Up to the age of 80 Harry remained in vigorous health, but then gradually lost muscular coordination, and finally passed away on January 26, 1964. He willed his collections, chiefly of minerals with a few plants, to the North Museum of Franklin and Marshall College, Lancaster, Pa., but had given duplicates of all notable plant finds to the Academy of Natural Sciences of Philadelphia.—EDGAR T. WHERRY.

The portraits accompanying this and the following obituary note were reproduced from Kodachromes kindly supplied by William L. Freyburger.



Hugh E. Stone, 1871–1964

Hugh E[xton]. Stone, a member of the Philadelphia Botanical Club for over 70 years (!) died on July 14th, 1964, in his 94th year, at West Chester, in his native Chester County. Although not an actual founder of the Club (he joined in 1892), he knew and participated in the activities of the founders. At the time of his death, he was not only the oldest member of the Club in actual years, but by far the oldest in terms of membership. For the last five years of his life he served first as Vice President, and then as Honorary Vice President of the Club.

Born in Coatesville, Pa., on the 12th of January, 1871, the son of John and Anne Exton [Steele] Stone, he came of families long settled in Chester County. For some 25 years he was on the staff of the National Bank of Chester Valley, Coatesville. In 1916 he became a member of a Philadelphia construction firm; at that time he moved to Haverford, which remained his residence until a few months before his death. In 1903 he married Louise Baker, who preceded him in death in 1953. They are survived by a daughter, Mrs. J. Gibson McIlvaine, Jr., of Downingtown.

Hugh Stone combined a life-long interest in field botany with a skill and delight in botanical painting. When his cousin, the late Dr. Witmer Stone, botanist and ornithologist, brought out his book, *The Plants of Southern New Jersey,* it was illustrated with drawings and reproductions of paintings by Hugh. (In a sidelight on the ethics of some botanical publishers, Hugh Stone often remarked to the writer that he recognized in several popular publications reproductions of his own drawings, reprinted without his permission or acknowledgment.) His real bailiwick was his own beloved county, Chester. It was always a pleasure for the writer to have Hugh Stone conduct him to some little-known spot in the county, where Hugh had kept a check on the flora for over 50 years.

Soon after taking up his avocation of botany he decided to try to enlarge the early 19th-century *Flora Cestrica,* by Dr. William Darlington. In 1945 the Academy of Natural Sciences of Philadelphia published the outcome: Stone's two-volume *Flora of Chester County,* which contained his own drawings as illustrations, one of the finest examples of a local flora in the U.S. In his introduction, he quoted the English naturalist, Gilbert White: "All nature is so full that that district produces the greatest variety which is most explored." Hugh Stone certainly demonstrated the richness of the Chester County flora; to the 983 species of plants which Darlington was able to include in his final edition of *Flora Cestrica,* 1853, Stone added nearly 400. He was particularly delighted to find that, in spite of the immense growth in population in the county since the days of Darlington, very few species had actually become extinct there. In the Stone work, localities for species are indicated and the names of collectors and repositories of specimens given. To the present writer, the most enlightening parts of the *Flora* consist in the detailed descriptions and enlarged drawings of the separate floral parts of numerous species.

He concluded his introductory notes with the words: "In my years of study of one locality I have been impressed by the fact that fairly complete acquaintance with its flora adds greatly to the interest and pleasure obtained from a visit to other fields. . . . My studies have added much to the joy of life and it is my sincere hope that someone may be inspired to study his or her locality, to collect and name plants that grow there and that this book may furnish some assistance."

Hugh Stone personally brightened many copies of his *Flora* by hand watercoloring a considerable number of the illustrations, an activity which occupied a major share of his attention in his later years. Both in the colored and uncolored state, his two-volume *Flora* has now become a prized collector's item. Even in his last years, he was able to attend meetings of the Club, and to enliven many field trips to Chester County and the New Jersey Barrens. In 1958 Haverford College awarded him an honorary degree of Bachelor of Science.

He presented his herbarium to the Philadelphia Academy some years before his death, and afterward his daughter gave the Academy his collection of more than 1,200 water-color illustrations of American species of plants, chiefly local.

Both by his kindly and enthusiastic personality, well known to members of the Club, and by his permanent achievements in recording and illustrating our local flora, Hugh Stone became, and remains, an inspiration to other amateur botanists.—RALPH M. SARGENT.

Notable Plants of Northeasternmost Pennsylvania

W. L. Dix

Research Associate, Academy of Natural Sciences of Philadelphia

In the course of a lifetime of exploration of northern Wayne County, in the northeastern corner of Pennsylvania, the writer has discovered occurrences of a number of rare or disjunct vascular plants. Now that he is no longer able to engage in active field work, it seems worth while to publish notes on these. Some, alas, have now disappeared (indicated here by the symbol †) and exact localities of certain rarities are not given, lest vandals destroy them also.

Athyrium pycnocarpon. This fern usually grows in less acid soils than are widespread hereabouts, and the only colony I have found is along a private pond west of Shehawken.

Dryopteris dilatata. This northern shield fern is still to be seen on wooded slopes near Orson. It occasionally hybridizes with other species here.

Polystichum braunii. Eastern Holly Fern once grew plentifully on the north slope of Shrawder Mountain about a mile south of Scott Center (†). However, the area was cleared by lumbermen a few years ago, resulting in a heavy growth of briers and rank weedy plants—especially *Impatiens*—which smothered all the ferns. At the only locality, a few miles farther south, where the species now remains, there are scarcely ten plants.

Thelypteris simulata. The so-called Massachusetts Fern occurs in a Hemlock-Rhododendron swamp between the highway and Bone Pond, north of Poyntelle.

Abies balsamea. I have not seen Balsam Fir in Wayne County, but it grows in a swamp near the Thompson-Lanesboro road about 3 miles west of Starrucca, Susquehanna County.

Juniperus communis var. *depressa.* While Ground Juniper is rarely encountered in northern Wayne County, a striking mat of it scarcely 2 feet high but covering an area at least 15 feet in diameter grows in a meadow west of the highway south from Scott Center. There is also a smaller one about a mile farther south.

Juniperus virginiana. Red Cedar is even more of a stranger to this area, but there is a solitary small tree in a pasture half a mile south of Shehawken.

Molinia caerulea. This grass immigrant from Europe covers a large area in the same field as the Ground Juniper.

Eriophorum spissum. American Hare's-tail Sedge was collected in a bog about half a mile northeast of Lakewood.

Juglans nigra. The large Black Walnut tree growing near an abandoned house about a mile south of Scott Center was doubtless planted there, but a young tree has come up nearby, so the species can be included as an introduced member of our flora.

Morus alba. White mulberries reputedly brought here by German settlers nearly a century ago are still growing on a hillside farm west of Lake Hiawatha (formerly Four-mile Pond). Seedling trees are coming up in the vicinity.

Sassafras albidum. Although rare in our area, a fine clone of Sassafras is to be seen on a hill about a mile west of Lake Shehawken. Both the glabrous and the pubescent-leaved varieties are known.

Potentilla anglica. The occurrence of this northern and European Cinquefoil here, the only one in eastern United States, was reported in Rhodora, vol. 51, p. 390, 1949, and included in the 8th edition of Gray's Manual. The locality is half a mile south of Shehawken across the road from the remains of an old farm house, but the details of the plant's introduction are obscure.

Acer negundo. Box-elder, rare this far north, is well developed around Camp Wayne at the outlet of Upper Twin Lake.

Andromeda glaucophylla and *Kalmia polifolia.* These northern heaths were abundant in a bog about half a mile northeast of Lakewood, but alas this was drowned out by the beavers a couple of years ago. (†)

Gaultheria (Chiogenes) hispidula. Creeping Snowberry has managed to survive around a beaver pond near Scott Center.

Rhododendron canadense. Our unique long known Rhodora field has been drained and "improved" by the State Department of Agriculture. (†).

Convolvulus arvensis. This weedy morning-glory has somehow been introduced along the highway about a mile south of Lakewood.

Polemonium reptans. This Polemonium, common only farther south, is thriving along the highway and near Hartley Sanford's farm house below the outlet of Lake Shehawken. Presumably it was originally introduced here, but it is now thoroughly naturalized. The State's other species, *Polemonium van-bruntiae,* has been collected by University of Pennsylvania botanists in an unquestionably native habitat west of Orson.

Mimulus moschatus. The Musk Monkey-flower, here as usual lacking the fragrance to which its species epithet refers, seems to be expanding its range in the general neighborhood of Starrucca. It occurs both southeast and west of that village, and along mountain roads up to 3 miles west from Melrose, Susquehanna County.

The Most Disjunct Species in Pennsylvania

Edgar T. Wherry

University of Pennsylvania

When the Limestone Oak Fern, *Gymnocarpium robertianum,* was discovered in Blair County, Pennsylvania, in 1941 (see *Bartonia* No. 21), it was regarded as the most extreme disjunct likely to occur in the State, for the nearest other locality known is in Douglas Co., Michigan, 450 miles away. A still more remarkable case of disjunction can now be placed in record.

The Portulaca Family includes a genus known as *Montia,* comprising a few species of small herbs, in North America far northern and west-montane in range. The 8th edition of Gray's Manual lists two species with tiny white flowers, one extending south to Maine, and a third with somewhat larger pink ones,—*Montia chamissoi.* The range of this is given as Alaska to New Mexico, Arizona and California, with one midland station: "Dripping sandstone ledges, Winona Co., Minnesota, local."

Most unexpectedly, in the course of checking sheets in the University of Pennsylvania herbarium for state flora records, there was found in the folder of *Claytonia caroliniana* a plant superficially resembling that, but actually representing this *Montia.* It had been collected by the late Arthur N. Leeds on July 2, 1893 and again July 4, 1894, at Cochecton Falls, Wayne Co. (dates far too late in the season for the *Claytonia*). This name applies to a small rapid in the Delaware river near Milanville, and a visit there made in the hope that the plant might be rediscovered proved fruitless, for a farm has been developed at that point along the river, and only cowbarn and pigpen flora were in evidence.

Montia chamissoi was, however, rediscovered in Wayne Co. by Stanley L. Glowenke on mossy ledges along the river a few miles further north on June 30, 1950. Here Nature has not been disturbed by man, but in recent years coarse grasses, notably *Calamagrostis canadensis* and *Phalaris arundinacea,* have been spreading rampantly along the river shore thereabouts, and this colony seems also to have vanished. Should anyone have the time and interest to explore rock ledges along the river from Delaware Co., New York, down to the Water Gap, the *Montia* might conceivably turn up again. Meanwhile, in order that its occurrence in Pennsylvania shall come to be recognized in plant geographic writings and ultimately in Manuals, the presently known situation is being placed on record:

Montia chamissoi has been collected at two points in Wayne Co., Pennsylvania, disjunct some 800 miles from the nearest known station in Minnesota, and utterly remote from the chief range of the species, Alaska to California.

Some Pennsylvania Barrens and Their Flora. II.

Edgar T. Wherry

University of Pennsylvania

The Shale Barrens and Their Endemics

These barrens develop on outcrops of a hard but flaky shale of mid-Devonian geologic age in the Appalachian Ridge-Valley physiographic province, in a strip of land from about 37° to 40° 30′ north latitude, across Virginia, West Virginia, Maryland and Pennsylvania. In the last state they lie chiefly in Bedford, Fulton, and Huntingdon counties, usually on south-facing hillsides with a stream at the base. They are occupied by well-spaced scrubby pine and oak trees, with sparse undergrowth on conspicuous bare rock ledges and talus slopes.

A number of endemic plants have been found to grow wholly or chiefly on these barrens, accompanied by species which though occurring also on other rocky habitats, become especially abundant there. Most of the endemics occur only in the southern part of the strip indicated, but a few have been found in Pennsylvania, and these are being discussed here. Exact localities are not being given because there is at present a vandal engaged in digging and removing to his garden (for certain death in a few years) every individual of any rare plant he learns about. Several of the colonies herein mentioned, marked by the symbol †, have already been destroyed by man's agricultural, highway-building, and weed-spraying activities, and it would be regrettable for those that have managed to survive these onslaughts to be wantonly destroyed by greed.

Virginia Clover, *Trifolium virginicum* Small.—This, one of the strictest of the endemics, was discovered in 1893 on the vast shale slopes of Kates Mt., West Virginia. In Pennsylvania it was first found south of Artemas in Bedford County (†) by S. C. Palmer and the writer in June, 1932; it is now known, chiefly as a result of search by Dr. David Berkheimer, at several other places in the same county.

Giant Evening-primrose, *Oenothera argillicola* Mackenzie.—Showiest of the shale-barren rarities, this was another of the Kates Mt. finds. It is not entirely limited to barrens, and was first found in Pennsylvania by J. K. Small in the summer of 1920 on shale ledges without typical barrens aspect opposite Losh Run, in Perry County (†). It later proved to be abundant in Huntingdon County, at several points east and south of the town of Huntingdon; especially fine colonies which once beautified the railroad cuts there could not withstand the application of weed-killers (†).

Mountain-pimpernel, *Pseudotaenidia montana* Mackenzie.—While this like the preceding was described from Kates Mt., and is especially abundant on barrens, it is not limited to them, spreading locally onto other dry rocks. It was first traced by the writer in 1952 along the wooded crest of Polish Mountain from Maryland into Bedford County, Pennsylvania.

Velvet-leaf Bindweed, *Convolvulus spithamaeus* subspecies *purshianus* Wherry. —This was discovered on a shale barren near Sweet Springs, West Virginia, by Pursh and described by him in 1814. His epithet for it being invalid, it was named in his honor *Convolvulus purshianus* by the writer in 1933. Although in the field its dense pubescence gives it a distinctive aspect, so that it can be recognized from a moving vehicle, it does not appeal to herbarium workers as worthy of nomenclatorial segregation: in Gray's Manual, Ed. 8, Fernald classed it as a mere un-nameworthy transition, in Britton & Brown ed. 3, Gleason considered it a variant meriting only passing mention. In accordance with the view that a taxon so well differentiated in characters and range, even if not a "good" species, does deserve some recognition, it was placed in subspecies status by the writer in 1958. While most frequent around shale barrens, it occurs in Pennsylvania on shale outcrops of other than barrens aspect, west as far as Somerset, and northeast to Northumberland counties.

Shale Ragwort, *Senecio antennariifolius* Britton.—This striking little rock plant was like others here discussed described from Kates Mt., and was discovered in Fulton Co., Pennsylvania by State Botanist Gress in 1930. It grows on a remnant of a shale barren left after highway construction, and has been found in the state only on one other barren in the same county.

Starry Moss Phlox, *Phlox subulata* subspecies *brittonii* (Small) Wherry.—The original form of this taxon, with the whitish petal-blades deeply notched to yield a 10-point star, was named from the barrens of Kates Mountain, West Virginia. It ranges down the Potomac valley on shale and occasionally other rocks, and is known to have spread into Pennsylvania on a single small shale-barren near Inglesmith, Bedford County. Shale outcrops of other than barrens character in many parts of the State support the pink-hued, less starry, type representative of the Linnean *Phlox subulata.*

SOME PENNSYLVANIA SAND BARRENS

While the Pine Barrens of New Jersey have long engaged the attention of botanists, the lesser areas of similar vegetation in Pennsylvania are also of considerable interest. These occupy land underlain by sand or gravel, from the upper levels of which mineral constituents other than silica have been leached and deposited in lower soil horizons, leaving the surface white, or gray from accumulation of carbonaceous matter. The barrens character is due to the deficiency of mineral nutrients within reach of shallowly rooted plants, and the considerable degree of acidity developed by the decay of organic matter in the absence of neutralizing basic elements. The surface, moreover, is either markedly dry, since rain water sinks deeply between the grains, or decidedly wet where a "hard-pan" has been formed by redeposition of leached-out materials, preventing water from draining away.

Sand Barrens have developed in areas of various extent scattered throughout Pennsylvania, and the features of a few of them will be briefly treated here. First come those of the Delaware Valley lowland, across southern Bucks, Philadelphia, and Delaware counties, which represent, as it were, a bit of New Jersey cut off by the southward swing of the River. Here collectors of the past found the sole occurrences in the State of various taxa characteristic of the Coastal Plain, most of them, alas, now exterminated by the spread of civilization, although a few still surviving in little-disturbed areas. Notable representatives comprise:

Chamaecyparis thyoides; Echinochloa walteri; Panicum amarulum, commonsianum var. *addisonii, longiligulatum* (omitted from current Manuals), *scoparium, spretum; Triplasis purpurea; Uniola laxa; Carex barrattii; Eleocharis tricostata; Juncus dichotomus; Smilax pseudo-china* (*S. tamnifolia*); *Sisyrinchium arenicola.*

Myrica heterophylla (*M. pensylvanica* variant); *Polygala lutea; Crotonopsis elliptica; Euphorbia ipecacuanhae; Ilex glabra; Ascyrum stans; Hypericum adpressum, H. denticulatum; Viola brittoniana; Rhexia mariana; Ludwigia sphaerocarpa; Proserpinaca intermedia, P. pectinata; Eryngium aquaticum.*

Sabatia campanulata, S. stellaris; Lycopus americanus var. *longii; Gratiola aurea* var. *obtusa* (omitted from current Manuals); *Utricularia fibrosa, U. inflata* var. *minor* (*U. radiata*); *Lobelia nuttallii; Aster spectabilis; Coreopsis rosea; Erigeron pusillus* (*Conyza canadensis* var. *pusilla*); *Eupatorium album, E. leucolepis; Helianthus angustifolius; Solidago tenuifolia.*

In the upland portion of the State higher elevations are largely based on the resistance to erosion of sandstone or quartzite strata, and the summits of plateaus and ridges are correspondingly favorable for the development of sand-barrens. The resemblance in vegetation of Pocono Plateau country to the New Jersey Pine Barrens is well known, and will not be discussed here, but the "Pennsylvania Pine Barrens" of Centre–Huntingdon counties merit attention.

In contiguous parts of these counties there outcrops an unusual sort of rock, a sandy dolomite, which weathers to produce a broad inter-montane valley-system, with surface accumulation of residual sand and consequent development of barrens, dry where rain water can sink deeply and wet where this is prevented by the formation of hardpan. The plants of these barrens have recently been discussed by Professor Walter F. Westerfeld of Pennsylvania State University (Castanea, vol. 26, No. 1, 1961). The following list comprises the more notable of these, the symbol SB signifying that they are also well developed on the Serpentine Barrens, and PB in the New Jersey Pine Barrens.

Lycopodium inundatum; Osmunda regalis var. *spectabilis* (SB, PB); *Pteridium aquilinum* var. *latiusculum* (SB, PB); *Woodwardia virginica* (PB); *Pinus rigida* (SB, PB).

Andropogon gerardi (SB), *A. scoparius* (SB, PB); *Aristida dichotoma* (SB, PB); *Bromus kalmii; Calamagrostis porteri; Danthonia spicata* (SB, PB); *Muhlenbergia glomerata; Oryzopsis racemosa; Panicum depauperatum* (SB, PB), *P. villosissimum* (PB); *Sorghastrum nutans* (SB, PB); *Carex oligosperma; Scirpus purshianus; Juncus acuminatus* (SB, PB), *J. brevicaudatus, J. canadensis* (PB), *J. debilis* (PB), *J. nodosus; Allium cernuum; Chamaelirium luteum* (SB); *Melanthium hybridum; Smilax rotundifolia* (SB, PB); *Spiranthes cernua.*

Salix humilis var. *microphylla* (*S. tristis*) (SB, PB); *Comptonia peregrina* (*Myrica asplenifolia*) (SB, PB); *Quercus ilicifolia* (SB, PB), *Q. prinoides* (SB, PB); *Sassafras albidum* (SB, PB); *Amelanchier arborea* (SB); *A. humilis; Prunus susquehanae; Rubus flagellaris* (SB, PB); *Desmodium canadense, D. rigidum* (SB, PB); *Lupinus perennis* (PB); *Ceanothus americanus* (SB); *Helianthemum bicknellii* (*H. majus*) (SB), *H. canadense* (PB); *Lechea intermedia, L. leggettii* (SB), *L. racemulosa* (SB, PB), *L. villosa* (PB); *Viola lanceolata* (PB); *Nyssa sylvatica* (SB, PB).

Chamaedaphne calyculata (PB); *Epigaea repens* (PB); *Gaultheria procumbens* (PB); *Gaylussacia baccata* (SB, PB); *Kalmia latifolia* (PB); *Lyonia ligustrina* (SB, PB); *Pyrola rotundifolia* var. *americana* (PB), *P. secunda, P. virens; Vaccinium atrococcum* (SB, PB), *V. corymbosum* (SB, PB), *V. macrocarpon* (PB), *V. myrtilloides, V. stamineum* (SB), *V. vacillans* (SB, PB); *Phlox ovata, P. stolonifera; Scutellaria integrifolia* (SB); *Trichostema dichotomum* (SB, PB); *Lindernia anagallidea; Melampyrum lineare* (PB); *Utricularia geminiscapa; Viburnum cassinoides* (PB); *Liatris borealis.*

A Medal Is Awarded

The members of the Philadelphia Botanical Club and other local naturalists received invitations to meet at the Academy of Natural Sciences of Philadelphia on the afternoon of September 10, 1964, for a medal presentation by the Cranbrook Institute of Science. The date had been chosen because it was the birthday of the recipient (and by a curious coincidence, also that of the person after whom the medal was named).

Cranbrook Institute of Science, Bloomfield Hills, Michigan (a suburb of Detroit) was founded in 1930 "to conduct research and aid in the diffusion of scientific knowledge." In 1946 the Mary Soper Pope Award was established there by Gustavus D. Pope as a memorial to his wife (1872–1940). This award, which is administered by the Institute Trustees with the advice of committees appointed by them, is in the form of a medal, given from time to time for "noteworthy and distinguished accomplishment in the field of the plant sciences."

On this occasion, Dr. Robert T. Hatt, Director of the Cranbrook Institute, came to Philadelphia to join with Mr. John W. Bodine, President of the Academy of Natural Sciences, in making the presentation. The Committee on the award, consisting of William Campbell Steere, Director of the New York Botanical Garden, Warren P. Stoutamire, Associate Botanist of the Cranbrook Institute, and Warren H. Wagner, Jr., Professor of Botany, University of Michigan, drew up this Citation, which was printed in a pamphlet distributed at the meeting:

> The Trustees of Cranbrook Institute of Science are pleased to recognize, by the award of the Mary Soper Pope medal, the career and personal qualities of Edgar T. Wherry.
>
> In his 79 years Dr. Wherry, a "naturalist" in the most meaningful sense of the word, and professor of botany at the University of Pennsylvania, was earlier in government service, successively as mineralogist, crystallographer, and chemist. It was thus with a broad background that he entered professional botany and was able, so successfully, to draw attention to problems of habitat, soil acidity, and rock formation in relation to plant growth and distribution. Professor Wherry is most properly associated in the minds of many biologists with plant ecology, and indeed some of his better known students are ecologists. His interests, however, extend into plant classification as well and over the past three and a half decades he has become recognized as a world authority on the phlox family and, too, on ferns and their allies. No "ivory tower" scientist, he has ever been willing to communicate his knowledge to the lay public, and two of his books—that on the wildflowers and that on the ferns—are popular as well as scientifically accurate publications. Dr. Wherry has furthermore been a more than willing helper of other botanists and has frequently traveled long distances for materials for the research of a fellow professional or for a graduate student preparing a thesis. Through his stimulation and inspiration, and through his ever ready willingness to foster the research of others, he has been an ideal member of the botanical community, and his contributions go much further than the impressive totality of his own published research.
>
> It is thus most fitting that Dr. Wherry should be a recipient of this medal, for few men can as well fit its standard of "noteworthy and distinguished accomplishment in the field of the plant sciences."

The pamphlet included a biographical sketch of the recipient, telling of his earlier work in non-botanical fields, and how chance encounters, especially with two plants, Walking Fern (*Camptosorus rhizophyllus*) and Box-huckleberry (*Gaylussacia brachycera*), led to his shifting to botanical research.

Dr. Hatt proceeded to make the medal presentation, and the recipient, after indicating how overwhelmed he felt by the honor of receiving it and by the presence of such a large number of friends, made a brief response, which is added below.

Academy of Natural Sciences of Philadelphia

Wherry Hatt Bodine

In honor of the occasion, a Ladies Committee of the Academy of Natural Sciences had provided light refreshments, and a huge birthday cake, appropriately embellished by roses and other flowers in the icing; this was duly cut and slices handed around, and Dr. Wherry was then personally congratulated by the numerous friends in attendance.

Acceptance of the Mary Soper Pope Medal

EDGAR T. WHERRY

Ordinarily the Mary Soper Pope medal presentation is made at a national convocation of scientists, but as I did not feel able to attend last month's meeting of the A.I.B.S. at Boulder, Colo., or December's meeting of the A.A.A.S. at Montreal, the present assembly was arranged. Holding it at the Academy of Natural Sciences of Philadelphia is especially appropriate, in that I have been associated with this Academy for some 60 years.

In 1903, as a young mineral collector just starting classes at the University of Pennsylvania, I learned from an announcement card on the bulletin-board of the expeditions being taken by what was then termed the Mineralogical and Geological Section of the Academy, and started to join them. The leader in those days was an elderly consulting geologist, Benjamin Smith Lyman, who had been employed by J. P. Lesley, the Director of the Second Pennsylvania Geological Survey, to prepare a detailed topographic and geologic map of the Triassic rock area of upper Bucks and Montgomery counties. On various occasions he led the group to points of especial significance in that region and I became deeply interested in the formations and phenomena of that geological period. My first paper, published in the Proceedings of the Academy for May, 1912, described some features of the diabase or "trap-rock" there.

On one of the trips in southern Bucks County attention was called to the fossil wood of this age occurring there, and when it turned out that this had never been technically studied, I looked up pertinent literature in the Academy's library. In those days books were assigned a number in the order of receipt, and filed in that sequence, so it was not always easy to locate those desired. The then Assistant Librarian, William J. Fox, knew however where everything was, and helped me find what was needed for fossil wood research. I was able to distinguish in the Pennsylvania Triassic wood one species previously known from Virginia, and two which I considered to be new, so a report on the subject was submitted to the Academy and published in its Proceedings for July, 1912; this was accompanied by an article on the correlation of the east-American Triassic with that of Europe. Professor Florence Bascom of Bryn Mawr College then invited me to serve as her field assistant in mapping the Triassic rocks of two geologic folios she was preparing.

After teaching at Lehigh University for a few years, I was invited in 1913 to go to Washington as an assistant curator of mineralogy at the U.S. National Museum, and four years later transferred to the U.S. Department of Agriculture. The way in which my interests shifted from chemistry and geology to plant ecology and other botanical fields is chronicled in the folder distributed to participants in the present meeting [there is a misprint—the name of the Chief Botanist of the Department was Coville].

While working in Washington I by no means lost touch with the Academy of Natural Sciences. One of my students, Samuel G. Gordon, became a curator of mineralogy here, and for a time I had various conferences with him. Then when botanical data were needed I came to consult the Academy's herbarium. Two of my earliest papers in my new field of interest, the relation of soil acidity to plant distribution, were published in the *Proceedings* for April, 1920.

When I returned to Philadelphia in 1930 to teach ecology at the University of Pennsylvania—a field of the greatest importance not only for plant and animal life but also in connection with the future welfare of the human race—I at once became active at the Academy and the affiliated Philadelphia Botanical Club, which recently designated me Honorary President. The then Curator of Botany, Dr. Francis W. Pennell, not only welcomed me cordially but also arranged for me to drive him in 1931 on a long collecting expedition to the west coast. He was specializing in the vast Figwort or Snapdragon Family (*Scrophulariaceae*) and I decided to pay special attention to a smaller one, the Phlox Family (*Polemoniaceae*). My earlier publications on this family appeared in *Bartonia*, the P.B.C. journal, and some later ones in the Proceedings and Notulae Naturae of the Academy. The several thousand plant specimens accumulated in the course of my studies have been donated to the herbarium of the Academy where I have been designated a Research Fellow.

So in expressing my thanks to the Cranbrook Institute of Science for this medal award, I especially appreciate it taking place here at the Academy of Natural Sciences of Philadelphia.

Notes and News

"Lady Botanist"

Members of the Philadelphia Botanical Club were pleased to learn that the New Yorker magazine, on its first "Talk of the Town" page in the issue of July 27, 1963, carried a long article headed "Lady Botanist"—who turned out to be none other than our recent past-president, Mrs. J. Norman Henry. The Editor relates that he was on his way to visit the New York Botanical Garden's Horticultural Director, Thomas H. Everett, but was side-tracked by a remarkable exhibition of photographs and equipment representing the activities of "Mary Gibson Henry. Botanist. Plant Hunter. Explorer." Ascertaining from Mr. Everett that this concerned a real, living, person, he arranged for an interview, and set down a pleasant résumé of her experiences.

She was taken by her nature-loving father at the age of seven to the Maine woods, and was delighted by the flowers there, especially *Linnaea borealis americana* [most unusual in a non-technical journal, spelled correctly]. In the 1900's she married Dr. Henry and they had five children, so she had time to raise only a few back-yard flowers. Then in 1926 they bought the 95-acre tract at Gladwyne [to which our members so greatly enjoy annual visits] and soon began trips to obtain plants to set out there. Items mentioned range from the use of a sharp spade to kill rattlesnakes, the thrill of expeditions to the wilderness of British Columbia, and the beauty of the Azaleas of Georgia. And it is noted that Mrs. Henry has developed hundreds of hybrid plants, and has pressed over 7000 specimens for the herbarium of the Academy of Natural Sciences of Philadelphia.—E. T. W.

Philadelphia Botanical Club Records, 1964

Program of Meetings

Date	*Subject*	*Speaker*	*Attendance*
Jan. 23	From the Sea to the Sierra in Ecuador	Dr. Patricia Allison	52
Feb. 27	Adventures on the Amazon	Dr. Robert F. Raffauf	43
Mar. 26	A Look at Some of Our National Parks	Dr. John M. Fogg, Jr.	49
Apr. 23	Gingkos, Taxads and Coniferae	Dr. Hui-Lin Li	46
May 16	Lunch and tour at the John J. Tyler Arboretum		20
May 28	Highlights of English Gardens	C. Gordon Tyrrell	30
Sept. 24	Reports by Members on Summer Activities		26
Oct. 22	The Earth's Changing Climate	Dr. Erling Dorf	52
Nov. 19	Summer Ends in the Tonquin Valley	Mrs. John M. Huebner	37
Dec. 17	A New Approach to Open Space in the Philadelphia Region		—

Officers, 1964

Dr. Edgar T. Wherry, *Honorary President*

Dr. Walter M. Benner, *President*
Dr. Ralph M. Sargent, *Vice President*
Mrs. Robert Robertson, *Secretary*
Mr. William L. Freyburger, *Treasurer*
Mr. Bayard Long, *Curator*
Dr. Edgar T. Wherry, *Editor*

Changes in the Membership List during 1964

NEW MEMBERS

William B. Brientnall, 238 Wood St., Burlington, N. J. 08016
Mrs. Mark F. Emerson, 1437 Steel Rd., Havertown, Pa. 19083
Mrs. Dorothy Graham, 1811 Addison St., Philadelphia, Pa. 19146
Donald Iffland, 18 Pickwick Lane, Newtown Square, Pa. 19073
William Overlease, Mill Rd., Box 144, R.D. 1, West Chester, Pa. 19380
Mrs. William Overlease, Mill Rd., Box 144, R.D. 1, West Chester, Pa. 19380
Mrs. Richard Philson, 321 Blaine Ave., West Berlin, N. J. 08091
Dr. Robert Speck, 737 Cedar Ave., Haddonfield, N. J. 08033

CHANGES OF ADDRESS

	Elected
Louis Cordivari, 814 Brown's Lane, Clayton, N. J. 08312	1962
Dr. Robert Robertson, 226 W. 2nd St., Moorestown, N. J. 08057	1960
Mrs. Robert Robertson, 226 W. 2nd St., Moorestown, N. J. 08057	1960
David L. Williams, 501 Churchville Lane, Southampton, Pa. 18966	1963

DECEASED

Edwin B. Bartram	December 3, 1964
Hugh E. Stone	July 14, 1964
Harry W. Trudell	January 26, 1964

No. 35 1965

BARTONIA

JOURNAL OF THE PHILADELPHIA BOTANICAL CLUB

CONTENTS

Botanical Studies in the Bangor-Portland Area in 1908 and 57 years later. .... DR. J. Z. HEBERLING 1

FIVE NEW PRESERVES

The Houdaille Wild Life Sanctuary, Northampton County, Pa. .... MRS. J. R. WILDRICK, JR. 7

The Churchville Nature Center, Bucks County, Pa. .... DAVID L. WILLIAMS 9

The Penllyn Natural Area, Montgomery County, Pa. .... THOMAS DOLAN 10

The Schuylkill Valley Nature Center, Philadelphia County, Pa. .... RICHARD L. JAMES 11

The Delaware Nature Education Center, New Castle County, Del. .... MRS. RICHMOND D. WILLIAMS 12

The Genus Phlox, Ten Years After .... EDGAR T. WHERRY 13

The Philadelphia Botanical Club, 1965 17

PUBLISHED BY THE CLUB

ACADEMY OF NATURAL SCIENCES, 19TH & PARKWAY

PHILADELPHIA, PENNSYLVANIA 19103

Subscription Price, $2.00. Back Numbers, $2.00 each

ISSUED MAY 25, 1966

MISSOURI BOTANICAL

JUL 5 - 1966

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

No. 35 1965

Botanical Studies in the Bangor-Portland Area in 1908 and 57 Years Later

DR. J. Z. HEBERLING
Bangor, Pa.

Picture, if you will, May 29, 1908 when Messrs. Bartram, Long, Van Pelt and Williamson, members of the Philadelphia Botanical Club, made their first of several botanical trips to Northampton County. Their destination was the area surrounding Bangor and Portland and a complete account of their investigations, written by S. S. VanPelt, appeared in Bartonia Vol. 1, No. 1, issued February, 1909. It is interesting to note the changes in this area 57 years later, particularly in regard to seasonal temperature, rainfall, transportation facilities, terrain and botanical records.

Our seasons are changing: Spring colder and Autumn warmer. In the not too distant past Spring was ushered in with days that were warm and balmy and they remained consistently so until the arrival of Summer. In contrast, referring to our notes dated April 4, 1964, "the weather has been unusually cold and the early wild flowers have shown little or no growth during the past three weeks. . . . The night temperatures have been as low as 22 degrees during the past week. To-day, April 25, 1965, was cloudy and cool and one has little desire to go into the woods with daytime temperatures around 48 degrees and with evening lows of 34 degrees." In our area now the oil, gas, and electric home-heating bills take a sudden drop after June 1st; would it be unreasonable to believe that this group of four from Philadelphia had removed the last ashes from their hand fired coal furnace or "sitting room stove" at least 6-8 weeks earlier?

A comparison of the rainfall and water supply to-day with that of 1908 would not be amiss because plants need water to grow and survive and we believe there was no scarcity of water in the Eastern U. S. at that time. Drought has now lasted four years in the East, however, and plans for more water-storage facilities in the area above Portland and Delaware Water Gap have been approved. One of the largest, the Tocks Island man-made lake will be 33 miles long with a shore line of 100 miles, involving the acquisition of 72,000 acres. Its environs will be known as the Delaware Water Gap National Recreation Area, and will be within easy driving distance of 30,000,000 Americans. The widespread destruction of the native flora by that construction and by the influx of millions of pleasure-seekers is beyond the imagination.

The narrow dirt carriage roads over which the "four footmen" from Philadelphia treaded for miles in search of specimens are fast disappearing. During 1965 no less than three such roads remaining in this area were invaded by the bulldozer and road-grader in preparation for widening and paving. The result was destruction of much roadside flora, and easier access for the urban motorist. Moreover, the four never saw the devastation resulting from the State-approved program for "weed-spraying."

Late in the afternoon of May 29, 1908 these four adventurous men might have been seen boarding a two-car steam train at the Reading Terminal bound for Bethlehem, the end of this branch of the Phila. and Reading Railroad. Can we picture them relaxing on the red plush straight-back seats in an open platform coach with large dome-shielded gas lights hanging above the aisle? Perhaps the locomotive was bellowing smoke and soot from its funnel-shaped stack, with our friends receiving the benefit through the open coach windows.

Leaving the train at Bethlehem, in the darkness of night they boarded the next trolley for Bangor via Wind Gap. To-day the trolley and the passenger train have bowed out of existence in favor of the bus and family automobile. Had they arrived in either Easton or Wind Gap to-day by modern bus after 7 P.M. they would have found themselves stranded for the night and would have had to board the bus for Bangor the following morning.

THE FIRST EXPEDITION, MAY 30-31, 1908

This began early on the morning of May 30, 1908, in a disagreeable drizzle. They were guided by two members of the four-man faculty of Bangor High School: Charles C. Bachman taught Grammar and Botany, and had been collecting plants in this area for several years. Up to the time of this trip his contributions to the Phila. Botanical Club herbarium numbered nearly two hundred sheets. He was a born collector and in his earlier years had paid attention to stamps and arrowheads as well as wild flowers. He died on Dec. 25, 1958 at the age of 82. John T. Hess, their other guide, taught Geometry and Algebra. He was an ardent lover of Nature, well acquainted with this area. His son is now the Postmaster of Bangor.

The areas covered during this two-day visit included a wooded section on high ground to the southwest of Bangor then called the "Greenwold," since re-named the "Greenwalk." It is now the site of a fish hatchery with numerous dams fed by a swift little stream of the purest water. Much of the wooded area surrounding the hatchery has not been disturbed. Rain kept the party indoors for the greater part of the 30th. On the 31st, without guides, they took the trolley to an area 3½ miles northeast of Bangor, getting off a little west of the village of Johnsonville. After exploring the numerous bogs in this area, a halt was made for dinner at the local hotel, where a demonstration was given them of practical Botany, the merits of strawberries preserved in the sun. (The Johnsonville Hotel still exists, with modernized interior, and on June 8, 1965, following the dedication of the Houdaille Wildlife Sanctuary a group of Nature lovers had a delicious dinner there with Dr. Wherry and Mr. Heinitsh of Bowmans Hill Wild Flower Preserve.)

Leaving the bogs around Johnsonville, they followed a route across cultivated fields to points near the Mt. Bethel railroad station (which has since been converted into an attractive residence and is occupied by a retired school teacher and his mother. The Johnsonville railroad station, it may be noted, has been razed, and a feed-mill now occupies its former site.) Leaving the Mt. Bethel station area the foot-weary party walked along the road to Portland where they took the train home, well satisfied with their experiences.

The following species were recorded as having been found on this first trip; the technical names [as in Gray's Manual of Botany, edition 8, 1950, Editor] are followed by the synonyms used in the 1909 article, in quotes " ". Most of them are still growing here; those not known to us amateur botanists who are searching for and photographing the plants today are marked by an asterisk *.

Alnus rugosa ("*incana*"), Speckled Alder. *Angelica atropurpurea,* Giant Angelica or Alexanders. *Arenaria* ("*Moehringia*") *lateriflora,* Broad-leaf or Grove Sandwort. **Arisaema triphyllum* ("*pusillum*"), Lesser Jack-in-the-Pulpit. *Betula lutea* ("*allegheniensis*"), Mountain Yellow Birch. *Caltha palustris* ("*flabellifolia*"), Marsh-marigold. **Carex bromoides, conoidea, flava, granularis, interior, lanuginosa, pallescens, tetanica,* and *trisperma,* Bog- and Wood-sedges. *Castilleja coccinea,* Painted-cup. *Circaea alpina,* Lesser Enchanter's-nightshade. *Conioselinum chinense,* Hemlock-parsley. *Coptis groenlandica* ("*trifolia*"), Gold-thread. **Cypripedium calceolus* var. *parviflorum* ("*C. parviflorum*"), Lady's Slipper. *Drosera rotundifolia,* Round-leaf Sundew. *Dryopteris cristata,* Crested Shield or Narrow Swamp Fern. *Equisetum fluviatile,* Water Horsetail. *Eriophorum gracile* and *viridicarinatum* ("*polystachyon*"), Cotton-sedges. *Geum rivale,* Purple Avens. *Lysimachia* ("*Naumburgia*") *thyrsiflora,* Tufted Loosestrife. *Parnassia glauca,* Parnassia. *Polygala paucifolia,* Gay-wings. *Rhamnus alnifolia,* Alder-leaf Buckthorn. *Rhododendron maximum,* Rhododendron. *Rubus pubescens* ("*ameri-*

canus"), Bog-raspberry. **Salix candida,* Hoary Willow. *Sisyrinchium mucronatum,* Slender Blue-eye-grass. **Stellaria calycantha* ("*Alsine borealis*"), Green Starwort. *Tiarella cordifolia,* Foam-flower. *Trillium cernuum,* Nodding Trillium. *Trollius laxus,* Eastern Globe-flower. *Veronica anagallis-aquatica* and *scutellata,* Speedwells. *Viburnum lentago,* Sheep-berry, and **rafinesquianum* ("*pubescens*"), Downy Viburnum. *Vitis vulpina,* Frost Grape. *Waldsteinia fragarioides,* Barren-strawberry.

THE SECOND EXPEDITION, JUNE 26-30, 1908

VanPelt arrived first and was joined the next day by Messrs. Bachman, Hess, and Bartram. Several new areas were explored on this trip in addition to those visited on the first. A peculiar projection from the Kittatiny mountain ridge looked alluring so they ascended the steep mountain slope to reach this projection, known as "Big Offset." Just below the summit of Big Offset they were rewarded with many good finds and on the descent from this mountain point more interesting specimens were collected. The bogs around Johnsonville were again visited and on the 28th they walked to a large wood west of the all-Italian settlement of Roseto, which lies adjacent to the town of Bangor. Then turning to a boggy slope near the Mt. Bethel railroad station and in a pine grove there collected some notable species; that pine grove has since disappeared.

An attack was then made on "Little Offset," a smaller projection on the Kittatiny range north of "Big Offset." This time they took a wagon as far as the foot of the mountain. In this area the slope is quite steep with many rocky ledges and actual climbing was often necessary. Two ponds were visited in the vicinity of Johnsonville. The first, then known as Brady's Lake and now re-named Echo Lake, was used for harvesting ice. To-day its shore-line is studded with private summer cottages. The other pond, a short distance away to the northeast, was known as Kemmerer's Lake. This has been re-named Lake PO-CO, is privately owned, and is a site for picnics, boating and swimming.

On June 30th, the last day of the second expedition, they were guided by Mr. Bachman in a new direction, two miles southwest of Bangor near a small village of Delabole. Walking down a railroad cut in this area they were shown some additional species by their guide.

Species additional to those previously noted, which were found on the second trip, comprised: *Acer pensylvanicum,* Striped Maple. *Allium tricoccum,* Ramps or Wood-leek. *Arethusa bulbosa,* Arethusa or Dragon-orchid. *Asclepias exaltata, incarnata* and *purpurascens,* Milkweeds. *Betula papyrifera,* White or Paper Birch. **Calla palustris,* Wild Calla. *Calopogon* ("*Limodorum*") *pulchellus,* Grass-pink Orchid. **Carex comosa* and *foena,* Sedges. *Caulophyllum thalictroides,* Blue-conosh. *Conopholis americana,* Squaw-root. *Cornus rugosa* ("*circinata*"), Round-leaf Dogwood. *Corydalis* ("*Capnoides*") *sempervirens,* Pink Corydalis. **Corylus cornuta* ("*rostrata*"), Beaked Hazel. *Diervilla lonicera,* Bush-honeysuckle. **Epilobium* ("*Chamaenerion*") *angustifolium,* Fire-weed. **Eriophorum tenellum* ("*paucinervium*"), a Cotton-sedge. **Fraxinus nigra,* Black Ash. **Glyceria* ("*Panicularia*") *canadensis* ("*elongata*"), *fluitans* and *pallida,* Manna-grasses. **Habenaria* ("*Gymnadeniopsis*") *clavellata,* Club-spur Orchid; *Habenaria* ("*Blephariglottis*") *fimbriata* ("*psycodes*"), Purple Fringe-orchid. *Isotria verticillata,* Five-leaf Orchid. *Lilium canadense,* Meadow Lily, and *L. philadelphicum,* Wood Lily. **Melanthium hybridum* ("*latifolium*"), Broad-leaf Bunch-lily. *Monotropa hypopithys* ("*Hypopitys* sp."), Pine-sap. **Naias flexilis,* Northern Naiad. *Nemopanthus* ("*Ilicioides*") *mucronata,* Mountain-holly. **Panicum scribnerianum* ("*macrocarpon*"), a Panic-grass. *Pogonia ophioglossoides,* Gold-crest or Beard Orchid. **Potamogeton pusillus,* a Pondweed. *Prunus pensylvanica,* Bird Cherry. *Pyrola secunda,* Side-bells Pyrola. *Pyrus* ("*Sorbus*") *americana,* Mountain-ash. *Ranunculus* ("*Batrachium*") *trichophyllus* ("*flaccidum*"), White Water-crowfoot. *Rhododendron* ("*Azalea*") *roseum* ("*canescens*"), Sweet Pinxter. **Rhynchospora capillacea,* a Beak-rush. **Ribes rotundifolium,* Round-leaf Wild-gooseberry. *Sambucus pubens,* Red-berry Elder. *Sarracenia purpurea,* Pitcher-plant. *Scutellaria epilobiifolia* ("*galericulata*"), Hooded Skullcap. *Smilax tamnoides* var. *hispida,* Bristly Greenbrier. *Solanum dulcamara,* Bittersweet Nightshade. *Trientalis borealis,* May-star. *Vaccinium angustifolium,* Narrow-leaf Blueberry. **Vaccinium* ("*Oxycoccus*") *macrocarpon,* Cranberry. *Veronica americana,* American Brooklime. *Woodsia ilvensis* and *obtusa,* Cliff-ferns. There were also two other ferns, not acceptably named in Gray's Manual: *Gymnocarpium* ("*Phegopteris*") *dryopteris,* Oak-fern, and *Thelypteris phegopteris* ("*Phegopteris ph.*"), Northern Beech-fern. [ED.]

THE THIRD EXPEDITION, JULY 31-AUGUST 2, 1908

On July 31st Mr. VanPelt came alone to the region and again examined the "Greenwold," but saw little of interest. The following day, accompanied by Mr. Bachman, he visited many of the areas which had been covered by the group on the second expedition the month before. On August 2nd at Mt. Bethel, a grassy meadow a little west of the springy slope, not before explored, was visited.

On this expedition only a few additions to the previous lists were made: *Actaea pachypoda* ("*alba*"), White Baneberry. **Carex scabrata,* a meadow Sedge. *Corallorhiza maculata* ("*multiflora*"), Summer Coral-root Orchid. **Decodon verticillatus,* Water-willow. **Eleocharis intermedia,* Low Spike-rush. *Epilobium strictum,* Gray Cotton-weed. *Habenaria* ("*Blephariglottis*") *psycodes,* Lesser Purple Fringe-orchid. *Liatris* ("*Laciniaria*") *spicata,* Spike Gay-feather. *Myrica pensylvanica* ("*caroliniensis*"), Bayberry. *Ophioglossum vulgatum,* Adders-tongue Fern. *Pyrus* ("*Aronia*") *melanocarpa* ("*nigra*"), Black Chokeberry. *Sanguisorba canadensis,* American Burnet. **Scirpus atrovirens,* Green Bulrush.

THE FOURTH EXPEDITION, SEPTEMBER 4-7, 1908

On September 4th Mr. VanPelt arrived in the afternoon and took a solitary trip through the "Greenwold." That evening Mr. Bartram arrived on the scene. The next day together with Mr. Bachman they made a final assault on "Big Offset." The main object of the ascent was to collect the fruit of Sorbus (Mountain Ash) the great scarlet clusters of which were making a gorgeous display.

By this time autumn flowers were out, the following being added: *Amphicarpa* (*"Falcata"*) *bracteata* var. *comosa* (*"pitcheri"*), Hairy Hog-peanut. *Aster acuminatus, A.* (*"Doellingeria"*) *infirmus, A. laevis* and *A. novae-angliae,* various Asters. **Cyperus flavescens* and *rivularis,* Umbrella-sedges. *Cypripedium acaule,* Moccasin Orchid, (in fruit). *Cystopteris* (*"Filix"*) *bulbifera,* Bulblet Fern. **Epilobium leptophyllum* (*"lineare"*), Narrow-leaf Cotton-weed. *Gentiana clausa* (*"saponaria"*), Closed Gentian and *G. crinita,* Fringed Gentian. **Helianthus giganteus* and *H. strumosus,* Sunflowers. **Ilex verticillata,* Winterberry, and **I. verticillata* var. *tenuifolia* (*"bronxensis"*), Thin-leaf Winterberry. *Lobelia kalmii,* Lime Lobelia. *Mikania* (*"Willugbaeya"*) *scandens,* Climbing Boneset. **Muhlenbergia mexicana* (*"foliosa"*) and *M. racemosa,* Muhlenberg-grasses. **Panicum flexile,* Slender Annual Panic-grass. **Penstemon digitalis,* White Penstemon or Beard-tongue. **Polygala verticillata* var. *ambigua* (*"P. ambigua"*), Slender Whorled Polygala. *Prenanthes* (*"Nabalus"*) *alba* and *P. trifoliolata,* Rattlesnake-roots. **Pyrus* (*"Aronia"*) *arbutifolia,* Red Chokeberry and **Pyrus* (*"Malus"*) *coronaria,* Wild Crab. **Quercus prinoides* and *Q. prinus,* Chestnut-oaks. **Scleria verticillata,* Whorled Nut-rush. *Solidaga patula, puberula,* and *uliginosa,* Goldenrods. *Spiranthes cernua* (*"Gyrostachys* sp."), Autumn Ladies-tresses. *Vaccinium vacillans,* Low-bush Blueberry.

These four lists include about 150 species; the acceptable technical names of more than a third of them prove to have been changed over the past half-century!

THE FIFTH AND FINAL EXPEDITION — OCTOBER 2-4, 1908

On October 2nd Mr. VanPelt made a final solitary trip to Bangor with the object of securing among other things more satisfactory specimens of *Solidago uliginosa* (Marsh Goldenrod). In the Johnsonville area he secured the fruit of *Parnassia* and better flowers of the Fringed Gentian. From here he walked for the first time into Bangor along the D.L. & W. railroad and near East Bangor saw an abundance of Climbing Boneset. On Sunday October 4th he went alone to Mt. Bethel and in the afternoon, from a little hill south of the *Ophioglossum* meadow, enjoyed a beautiful view of the ever impressive Delaware Water Gap.

Quoting "The whole peaceful scene, together with the satisfaction arising from the very successful results of this long series of expeditions combined to awaken the most pleasing thoughts and lent a peculiar charm to these last hours in Northampton County."

The Houdaille Wildlife Sanctuary, Northampton County, Pa.

MRS. JOHN R. WILDRICK, JR.
Portland Garden Club

The botanical interest of the region between Bangor and Portland was first recognized by a group of Philadelphia Botanical Club members around 1908, and their exploratory trips were recounted by one of the party, S. S. Van Pelt, in the first issue of Bartonia in 1909. In woods, swamps, bogs, meadows and even railroad ditches they were able to collect for addition to the Club's herbarium a number of species either very rare or previously unknown in the southeastern counties of Pennsylvania. Dr. J. Z. Heberling of Bangor, an outstanding wild flower photographer, summarizes their activities in the preceding article.

When studying the soil-reaction of native plants for the U. S. Department of Agriculture in the 1920's, Dr. Edgar T. Wherry read Van Pelt's article and was struck by the apparent mingling of species which he had found elsewhere to favor circumneutral or limy habitats with those which require considerable acidity. He accordingly visited several of the reported localities, making soil acidity tests with the then newly developed indicator dyes which show by color-changes whether a soil is acid or circumneutral. The soils and spring waters around Bangor proved, as the species growing there suggested, to be by and large on the acid side. On the other hand, around Johnsonville and Mt. Bethel, limy spring water was coming up here and there and neutralizing the deeper layers of the soil. At the same time, near the surface, where leaching by rain is effective, a veneer of acid had developed. The mingling of species of divergent soil reaction requirements could thus be explained: Shallow-rooted sorts can find sufficient acidity for their needs, while deep-rooted ones have no difficulty in obtaining enough lime.

In 1963, Dr. Wherry's attention was focused once again upon this unique area while searching for a special soil to create a habitat for rare lime-favoring plants of Pennsylvania, in the Bowman's Hill Wild Flower Preserve in Washington Crossing State Park. A visit to the area was made by members of the Preserve Executive Committee. Inquiry of the local residents led to the information that some of this marsh land was owned by a sand and gravel company, but lacked any deposits of interest to them. A member of the Portland Garden Club obtained permission from the company's local office, resulting in the desired soil being transported to the Preserve to provide this unusual soil condition there.

Later, guided by Dr. and Mrs. John R. Wildrick, Jr. of Portland, Dr. Wherry, Mr. W. Wilson Heinitsh, of the Bowman's Hill Wild Flower Preserve Executive Committee, and Mr. Franklin B. Buser, botanist at the East Stroudsburg State College, retraced the limy bog and contiguous areas covered by the members of the Philadelphia Botanical Club back in 1908.

The Van Pelt party had generally followed trolley and railroad tracks, recording findings with reference to these. In the intervening years most tracks have been removed, new roads constructed, trees lumbered, glacial deposits excavated and grasslands grazed, but many notable plants reportedly found in 1908 are still holding their own. The rarer species of the limy bogs appear to have received protection from damage by the nature of the land itself.

It was the association with these naturalists that inspired the conservation chairman of the 25-member Portland Garden Club to attempt the setting aside of one of these limy bog areas as a wildlife sanctuary. This developed into a joint endeavor with the Lehigh Valley Bird Club of the National Audubon Society.

The property-owner — The Houdaille Construction Materials, Inc. of Morristown, New Jersey — has an excellent community relations program and Mr. William E. Joseph, Vice President of Properties and Public Relations, proved to be a friend of conservation. With his sympathetic cooperation a lease was granted the two clubs for an 18 acre plot which was named by the group the Houdaille Wildlife Sanctuary at a dedication ceremony on June 8, 1965, where Mr. Joseph presented the lease to club representatives.

The lessee proposes to extend the lease from year to year for a $1.00 nominal fee, together with the submission of a requisite certificate of insurance covering bodily injury liability and property damage liability. The Houdaille Company retains the right of cancellation, but merely as a formality.

Dr. Wherry and Mr. Heinitsh were speakers at the dedication. Dr. Wherry related his scientific findings of the 1920's and commended the acquisition of this land to preserve native plant and animal life. Mr. Heinitsh expressed hope that "the sanctuary would protect native wild life from the world's most destructive animal . . . man."

History was repeated, following the dedication, when honored guests enjoyed a dinner at the Johnsonville Hotel where the Bartonia group had dined in 1908, now owned and operated by a grandson of the proprietor in those days.

The Houdaille Wildlife Sanctuary contains a calcareous bog, a climax beech forest, a creek, several springs, a lowland forest and a pond basin is reverting back to marshland. The area will be preserved in its natural state for utilization in a school and community conservation program.

Entry into the Sanctuary is by permit only. Membership in either club grants this privilege. Small organized college and high school groups may visit the area with special permission, accompanied by a member of the Sanctuary Committee. As a protective measure only one path through the Sanctuary is planned.

This cooperation between industry and conservationists in preserving a unique habitat for wildlife is an illustration of a favorable approach to the management of otherwise unused private land. As places where ecological relations of this sort can be seen and studied scientifically are infrequent, and agricultural activities and housing developments are ever encroaching upon them, the setting aside of such areas for Nature Sanctuaries is greatly to be desired. The reward consists in establishing a mecca for scientists, and a living classroom for students of ecology.

The Churchville Nature Center, Bucks County, Pa.

David L. Williams

Naturalist, Churchville Nature Center, Southampton, Pa.

Beginning about 1957 plans were formulated for the creation of a 750-acre Park in Northampton Township, Bucks County, active promotion of the idea among local residents being carried on by a Churchville Park Advisory Committee, Lewis W. Hull, Chairman. A Nature Center Sub-committee, Lester S. Thomas, Chairman, proposed starting with a small Wild-life Preserve and Museum, where interested persons could receive instruction in Nature appreciation. It was manifestly desirable to locate this near Churchville Reservoir, which was already widely known to local naturalists as a favorable site for the observation of a considerable variety of bird life. Many details required attention, but the project has now been successfully carried out.

In June, 1965, the Bucks County Park Board, Robert W. Pierson, Executive Director, formally designated as a Nature Center a 35-acre tract of land east of the Reservoir north of Churchville Lane, a mile east of the village of Churchville. A good-sized residence at the south end of the tract was remodelled, so that the ground floor serves as the Nature Museum, with accompanying class-rooms, and the upper story as residence quarters. Along Churchville Lane east of this an ample parking lot was laid out.

The Nature Center tract comprises only some third-growth woodland interspersed with long-disused fields, but is sufficiently varied in topography and soil to permit the development of multiple vegetation-types. Trails winding through the various habitats have been laid out, points of interest along them being marked by numbered stakes. Many groups of both adults and children are being guided over these, and classes in various phases of Nature Study are being held in the Museum.

Botanically the area is not outstanding, although there are striking colonies of Turks-cap Lily (*Lilium superbum*) and Purple Milkweed (*Asclepias purpurascens*) in the meadow-land. The pioneer vegetation of the old fields consists largely of grasses and composites such as Goldenrods, but this is now being invaded by various shrubs and lesser trees, some of which notably species of *Cornus* and *Viburnum* are showy both in bloom and fruit. On a dry slope toward the north border there have appeared clumps of Downy High-bush Blueberry (*Vaccinium atrococcum*) and of the rare Small-flower High-bush Blueberry (*V. caesariense*).

On the slope back of the Museum Building a spring emerges, the water from which has been channeled into a small artificial pond, which Nature soon colonized with Cat-tails and other aquatics. A botanical survey of a circle with 3-mile radius has indicated the presence of several hundred native species, and it is planned to transfer sample clumps of the more notable of these to the Nature Center itself.

The Penllyn Natural Area, Montgomery County, Pa.

THOMAS DOLAN

Executive Director, Wissahickon Valley Watershed Association, Inc.

This Nature Sanctuary, located at the west margin of the community of Penllyn, in Whitpain Township, extends for 1600 feet along Wissahickon Creek, northwest from the Bluebell Pike. Much of it is on the creek flood-plain, but the land slopes up well above water level at both northeast and southwest margins, so that varied habitats are represented. The following account is taken from "Wissahickon Watershed News," vol. 7, No. 2, June, 1965:

"After 2½ years of planning and hard work, the Penllyn Natural Area was opened to the public at an on-site ceremony on May 11, 1965. Almost 100 members and guests gathered at the Area to hear Mr. Clayton M. Hoff, Executive Director of Forward Lands, Inc. (Delaware) point out the need for outdoor museums, regardless of size, in the busy life of the urbanized citizens.

Mr. and Mrs. Benjamin Dintenfass, donors of the 18-acre tract to the Association, were introduced by President Dolan, who reminded the assemblage of the vision behind their open space gift and the fact that it has precipitated other offers of land in the watershed. Mr. Dintenfass received the Association's Annual Certificate of Merit in 1963.

Comments of appreciation were directed by Mrs. James R. Miller, Chairman of the Natural Area Committee, towards the many organizations and individuals who had supported the development of the Area. Responsible organizations included, in addition to her Committee, member clubs of the Garden Club of America, Boy Scouts, and the Germantown Boys Club. . . .

President Dolan announced at the annual dinner that the Association had entered into a lease agreement with La Salle College for sufficient land within the Penllyn Natural Area on which to build a one-story, 30 ft. by 20 ft. ecology laboratory. . . . The Area has been used by students from both La Salle and Temple University during the past academic year for ecological studies."

To facilitate access to the interior of the area, two trails have been opened, the longer around 2,000 feet, and a third is being made ready for use in spring, 1966. These are marked by numbered yellow-tipped stakes, and a brochure listing items of natural history interest at each numbered point has been issued. Simple labels bearing common and technical names have also been attached to notable trees by wires adapted to expand as the trunk does. Regrettably it must be reported that some vandalism has occurred, but this seems unavoidable these days.

Dr. Wherry has made a botanical survey from October, 1964 to September, 1965, and reports that at least 400 species of ferns and flowering plants are growing in the Natural Area, and 100 additional ones within a radius of one mile.

The Schuylkill Valley Nature Center, Philadelphia County, Pa.

RICHARD L. JAMES
Director, S. V. N. C., Philadelphia 19128

A three-hundred acre tract of open ridges and deep wooded ravines, located in the northwest corner of Philadelphia County, extending roughly from Ridge Ave. to the Schuylkill River, and from Port Royal Ave. to the City line, was incorporated in April, 1965, as the Schuylkill Valley Nature Center. Its Board of Trustees is headed by Mr. Henry Meigs, and includes prominent local naturalists; it is adequately endowed. This represents the outcome of several years of planning in cooperation with the Nature Centers Division of the National Audubon Society.

Active work in the area began in July, 1965. The open land is largely covered by coarse grasses and scattered shrubs; much of the woodland has grown up into a jungle, dominated by Japanese Honeysuckle and Asiatic Bittersweet. In the past fires set by irresponsible persons have periodically swept through this combustible vegetation, so the first undertaking has been the opening of fire-lanes to retard these. The Philadelphia police are now regularly patrolling the tract.

The second phase of the work will concurrently include the construction of an Interpretive Education Building, several Nature and Geology trails, and the assembling of a staff. The building is to serve as a museum and as headquarters for several full-time teacher-naturalists; these will conduct classes for school children as well as the general public. In addition to self-guiding trails, one trail will not be marked, but will enable the serious visitor to explore the varied terrain at random. Official opening is planned for October, 1966.

A preliminary study of the floral records (by Dr. Wherry) indicates that around 500 native species have already been collected in or closely adjacent to the Center. Most of the area is underlain by metamorphic rocks of general granitic character, but along the northwest boundary there is a dike of basic igneous rock which has altered into serpentine and talc ("soapstone") with streaks of dolomite. This was explored by the amateur botanists of Philadelphia a hundred years ago, and proved to support disjunct occurrences of several notable rarities, which commonly grow elsewhere on rocks rich in lime and magnesia. A list of these may be added, although the quarrying away of the river-facing bluffs for commercial soapstone and the subsequent invasion by coarse weeds has eliminated most of them; two which are known to have survived are marked by an asterisk (*). Scotts Spleenwort, *Asplenium ebenoides*. Wall-rue Spleenwort, *Asplenium ruta-muraria*. Walking-fern, *Camptosorus rhizophyllus*.* Bulblet-fern, *Cystopteris bulbifera*. Hairy Cliff-brake, *Pellaea atropurpurea*. Smooth Cliff-brake, *Pellaea glabella*. Eastern Grama-grass, *Bouteloua curtipendula*. Sedges, *Carex conjuncta* and *C. hirtifolia*. Putty-root Orchid, *Aplectrum hyemale*. Muhlenberg Oak, *Quercus muhlenbergii*.*

The Delaware Nature Education Center, New Castle County, Del.

MRS. RICHMOND D. WILLIAMS
President, D. N. E. C., Wilmington, Delaware

This non-profit, educational, scientific institution was incorporated on September 25, 1964 to help preserve representative natural areas in our State, and to provide an interpretive and educational program pertaining to them in order to foster understanding, appreciation and enjoyment of natural land and man's dependence on a balanced ecology.

Late in 1962, Recreation, Promotion and Service, Inc. had called together a group of people interested in nature, conservation and education, to consider establishing a Nature Center in the Wilmington area. In February 1963, this group presented a program on Nature Centers to the Junior League of Wilmington; they felt there was much interest in this project and arranged with the Nature Centers Division of the National Audubon Society to prepare a Plan for Wilmington, Delaware. In May, 1964, the Audubon Report was presented at a conference attended by about one hundred individuals including representatives of local organizations interested in the natural sciences. This resulted in the appointment of an organizing committee, and following a second conference, the Delaware Nature Education Center was formally incorporated last Fall.

We promptly initiated a small program of nature-interpretive walks through the fields and woods along the east bank of the Brandywine Creek under the leadership of a naturalist-teacher. The encouraging popular response and the experience gained thereby, led to an agreement with the State Park Commission of Delaware in establishing a nature education program at Brandywine Creek State Park. A small building was renovated this Spring to serve as trailside headquarters. Since April, 1965, over 100 walks have been held under the guidance of qualified paid personnel, volunteer naturalists and board members. Almost 2,000 people have attended, including 1,300 children. Except for this program, which is arranged through reservations, the Park is not open to the public as yet.

The DNEC has worked closely with the State Park Commission of Delaware in planning the establishment of Indian Spring Nature Center at Brandywine Creek State Park. It will comprise some 155 acres of wooded hills, open fields, spring-fed streams, a small marsh and frontage on the Brandywine. This will be the outdoor classroom for teaching basic conservation and ecology, and furnish opportunities for exploring, observation and research. The Commission will provide a Nature Center building, utilities, maintenance and security and the DNEC will be responsible for staff, program administration and educational equipment.

Eventually we hope to establish nature-education programs in each of the ecologically different areas in Delaware such as the piedmont, ocean beach, tidal swamp, Loblolly Pine forests, Cypress swamps and coastal plain.

The Genus Phlox, Ten Years After

EDGAR T. WHERRY
Philadelphia, Pa.

Late in 1955 there was published as Monograph No. 3 of the Morris Arboretum a book of some 175 pages entitled The Genus Phlox. This presented in detail the results of my over 30 years of study of the genus (the start of which was discussed in Bartonia No. 11). Being at the time nearly blind with cataracts (one later successfully operated on) I was unable to cross-check and proof-read the ms. fully, but all major data and conclusions were clearly set forth. Now ten years later it is time to discuss subsequent developments.

While the book received several favorable notices, one curiously critical review of it was published in Baileya, vol. 4. The reviewer seemed to misunderstand the aim of the work, which was first of all to correct errors in previous writings on the genus, especially those made by the German monographer Brand in 1907. So he held that "This publication does not facilitate identification of taxa within the genus Phlox. For this we must still rely on the monograph of Brand." Actually, had Brand's writings been dependable, there would have been no need for another monograph. But Brand was handicapped by lack of field acquaintance with Phloxes, as well as by an inadequate series of correctly identified herbarium specimens, and accordingly his interpretations were frequently faulty.

Even an incompetent monographer (implied in the review), as the result of many years of field work and the study of thousands of specimens, could scarcely fail to recognize relationships which eluded an ill-informed worker of an earlier day. The reviewer's criticisms of various details were either based on items taken out of context, or represented a lack of appreciation of the complex variability in the genus, and deserve no individual refutation. Especially amusing was his assertion that "the citation of natural distribution by township names [which I actually did not use] and geographical coordinates . . . is inconvenient unless one has ready access to . . . U. S. Geological Survey maps." As many *Phlox* localities lay in areas for which at the time no such maps had been made, I went to considerable trouble to ascertain their latitudes and longitudes, and published these to enable others to locate them with a minimum of effort *in any atlas*.

In naming major subdivisions of the genus, I added prefixes to the genus name. This procedure was challenged by Verne Grant, who in his scholarly work on the Phlox Family in 1959 used instead names presumed to have priority. Actually the circumscriptions of the groups involved were so dissimilar that I did not feel thus constrained. In particular, Gray's group, (conventionally interpreted as a "section") *Occidentales* was merely a geographic category comprising *all* western taxa, and so included members of all three of my sections.

The Baileya review made it evident that workers at the Hortorium differed from me in respect to the application of certain rulings in the International Code of Botanical Nomenclature. Thus, I considered it sufficient to state on an introductory page that "subspecies [are] . . . designated by trinomials without interposed category-symbol;" others feel that "subsp." should have been inserted in each case. Realizing that according to the Code, when two or more different names are proposed simultaneously for the same taxon by the same author, none of them is validly published, I listed as "acceptable synonyms" only those proposed *previously*. However, in order to render my new names fully satisfactory for use in the forthcoming Hortus 3, I republished 22 of them with "ssp." inserted, and only the basionym cited, in 1956. (I prefer this simplified form to the official "subsp.")

To designate subordinate taxa containing the type of a higher one, Hooker and his contemporaries used the prefix *eu-*, which proved so convenient, expressive and unambiguous that it was widely accepted for a century; Brand, it may be noted, applied it throughout the genus *Phlox*. Recent Code-compilers have, however, seen fit to illegitimize this prefix. As the use of the same epithet at two different levels, which they require, introduces in discussions of relationships rather undesirable complexity, I revived for *Phlox* another early plan, the prefixing of the epithet of the lower type-containing group by the Greek letter *alpha*. Workers who disfavor this can merely delete the prefix and have an unchanged epithet to use at as many levels as desired; but my protest against arbitrary Code rulings was made!

During the ten years following the appearance of The Genus Phlox, the following nomenclatorial novelties have been proposed:

1955. *Phlox divaricata* var. *laphamii* forma *candida* Palmer & Steyermark. A substitute for the admittedly invalid *P. laphami* cv. 'Alba' Hort. *ex* Wherry.

1958. *Phlox dispersa* Sharsmith. On page 144 of the monograph under *P. douglasii rigida* an occurrence was noted "disjunct in the southern Cascades and possibly worthy of ssp. segregation." Dr. Sharsmith's detailed study of the taxon concerned made its still higher status reasonable.

1959. *Phlox hendersonii* (E. Nels.) Cronq. This is considered to be a "well-marked species," but its aspect is that of a reduced alpine ecad of *P. douglasii rigida*. Unless and until reciprocal transplants and concomitant cytogenetic studies can be carried out, status-assignment of such material is an essentially subjective matter, and I still prefer to retain this under its manifest progenitor, as *P. douglasii* ssp. *hendersonii*.

1959. *Phlox kelseyi* var. *missoulensis* (Wherry) Cronq. This combination is deemed wholly inacceptable. *Phlox kelseyi* is an upstanding saline marsh plant with somewhat succulent texture, *P. missoulensis* a caespitose thin-leaved high-dry-land occupant. They differ completely in indument and in numerous morphologic details. On the other hand, taxon *missoulensis* agrees closely with *Phlox douglasii* in texture, indument, etc., differing chiefly in its larger leaves. If reduction in status is ever called for, then, these are the two which belong together.

1959. *Phlox pulvinata* (Wherry) Cronq. This completely intergrades with *P. caespitosa,* of which it represents merely a high-altitude ecad, and so is deemed unworthy of species status. On the other hand the endemic relatives *nudata* and *platyphylla* are more distinct, and merit a better fate than submergence in subjective synonymy. In the Vascular Plants of the Pacific Northwest several other taxa got tossed around from one place to another without any evidence being adduced; these were noted by the writer in 1962, and one especially awkward situation is discussed in the December, 1965, issue of Sida.

1960. *Phlox bifida* ssp. *arkansana* Marsh. This taxon was referred to in the Monograph as occurring in the Interior Highlands from War Eagle to Huntsville; because of its short styles it was identified as *P. oklahomensis,* associated long-styled material being treated as *P. bifida* ssp. *stellaria.* As it is unrealistic to class a member of the short-styled Section of *Phlox* as a relative of a member of the long-styled Section, as proposed by Mr. Marsh, reclassification of the taxa concerned is called for. This is not being attempted here, since prior cytogenetic study of the problem seems desirable; unfortunately, according to Dr. Delzie Demaree, who kindly visited several collection-points in 1965, climatic changes seem to have nearly exterminated the heretofore known colonies.

1961. *Phlox bifida* var. *induta* Shinners. In the diagnosis of this the style-length was not noted, but every descriptive detail given fitted the relatively nearby *Phlox oklahomensis* rather than the more remote *P. bifida.* Subsequent study of the type specimen in the SMU herbarium showed the styles to be indeed short enough to place the taxon under the first-named species, without any differences of varietal significance being recognizable. Discussion with local botanists indicated that the type locality is 4 miles east rather than "northeast" of Garland.

1961. *Phlox johnstonii* Wherry. As it was for some years represented by good specimens only in the LL herbarium, the existence of this notable endemic was not recognized until the Phloxes in that were studied in 1960. Its area, which lies about 100 miles disjunct from those of the other annual Phloxes, was visited subsequently and material pressed for placing in other herbaria.

1963. *Phlox sibirica* ssp. *borealis* (Wherry) Shetler. This change in status is not unreasonable, since the two taxa differ essentially only in size of parts. However, the matter can not be considered settled until a cytogenetic comparison of the two is made.

1964. *Phlox drummondii* ssp. *johnstonii* (Wherry) Wherry. Since this taxon after all differs in only rather minor respects from other members of the *Phlox drummondii* complex, reduction in status has seemed desirable.

1964. *Phlox drummondii* ssp. *tharpii* (Whitehouse) Wherry. Study of copious herbarium material has led to a change in previous views of the relationship of this taxon. Its range well to the southwest of other members of the complex favors its subspecies status.

1964. *Phlox maculata* ssp. *pyramidalis* as a hybrid. Levin reported a hybrid swarm between *P. glaberrima* ssp. *interior* and *P. maculata,* type ssp., in northern Indiana, some individuals of which were considered to "look like *Phlox maculata* ssp. *pyramidalis*." As a rule, hybrids exhibit multiple features intermediate between those of the parents. In the table of characters given, however, there is a hint of intermediacy only in leaf-breadth, whereas in three other respects there is negative intermediacy. The most significant feature of taxon *pyramidalis,* many more nodes than in either presumptive parent, is not mentioned (spacing between nodes is not meaningful since it is influenced by environment, plants growing in the open having the nodes relatively close, and shaded or crowded ones more spaced). Also un-noted is the fact that the peduncle-length and correspondingly thyrse-diameter in taxon *pyramidalis* is less than that in either of the other taxa. Finally, over much of its range it blooms later than either of them. These anomalies remain unexplained.

1965. *Phlox pilosa* ssp. *sangamonensis* Levin & Smith. Morphologically this taxon is essentially identical with the precursors of ssp. *detonsa* which occur in the Interior Highland Refuge, where the species as a whole survived much geologic-climatic change, and began to split up into infra-specific taxa. As the Tertiary seas withdrew some of these spread southward over the developing Coastal Plain, and there was ample time for ssp. *detonsa* to become differentiated from the type subspecies. The distribution map of taxon *sangamonensis* shows it to have spread radially northeastward from that Refuge as the Pleistocene ice melted away, but in this direction there has been insufficient time for evolutionary change. That the potentiality is there is shown, however, by the close agreement in chromosome-arm ratios and identity in chromatograms with ssp. *detonsa.* Whether such a transitional plant deserves subspecific status is a subjective matter.

REFERENCES

HITCHCOCK, C. L., CRONQUIST, A., *et al.* Vascular Plants of the Pacific Northwest, part 4, 1959.

LEVIN, D. A. Amer. Journ. Bot. 50: 714, 1963.

———— & SMITH, D. M. Brittonia 17: 254, 1965.

MARSH, D. L. Trans. Kans. Acad. Sci. 63: 16, 1960.

PALMER, E. J. & STEYERMARK, J. A. Rhodora 57: 316, 1955.

SHARSMITH, C. A. Aliso 4: 128, 1958.

SHETLER, S. G. Rhodora 65: 220, 1963.

SHINNERS, L. E. Southw. Nat. 6: 50, 1961.

WHERRY, E. T. The Genus Phlox. Morris Arb. Mon. 3, 1955.

————. Baileya 4: 97, 1956.

————. Wrightia 2: 198, 1961.

————. Madroño 16: 270, 1962.

————. Sida 1: 250, 1964.

————. Sida 2: 154, 1965.

The Philadelphia Botanical Club, 1965

Dr. Edgar T. Wherry, *Honorary President*
Dr. Walter M. Benner, *President* Mr. William L. Freyburger, *Treasurer*
Dr. Ralph M. Sargent, *Vice President* Mr. Bayard Long, *Curator*
Mrs. Robert Robertson, *Secretary* Dr. Edgar T. Wherry, *Editor*

active members (as of December 31, 1965)

	Elected
Mrs. C. J. Allen, Jr., Woodside Lane, Riverton, N. J. 08077	1957
Mrs. F. E. Atkins, 3422 Queen Lane, Philadelphia, Pa. 19129	1953
Mrs. A. C. Barnes, Box 128, Merion Station, Pa. 19066	1942
Dr. Walter M. Benner, 5636 Loretta Ave., Philadelphia, Pa. 19124	1912
Dr. David Berkheimer, Limekiln, Berks Co., Pa. 19535	1943
Mrs. Roscoe Bowers, Braddocks Mill Lake, Marlton, N. J. 08053	1963
Miss E. Marie Boyle, 1521 Norman Rd., Havertown, Pa. 19083	1965
Mrs. Robert A. Bradel, 900 Overton Ave., Morrisville, Pa. 19067	1963
William B. Brientnall, 238 Wood St., Burlington, N. J. 08016	1964
William C. Brumbach, 850-D Berkshire Drive, Reading, Pa. 19600	1943
Miss Margaret Butler, 4598 Castor Ave., Philadelphia, Pa. 19124	1953
Richard B. Chillas, 233 Winona Ave., Philadelphia, Pa. 19144	1942
Miss Carola S. Collings, 1728 Pine St., Philadelphia, Pa. 19103	1954
Mrs. Alan Crawford, White House Rd., Devon, Pa. 19333	1962
W. L. Dix, Methodist Church Home, 70 Stockton Ave., Ocean Grove, N. J. 07756	1942
Albert Donaghy, Jr., R. D. 1, Pottstown, Pa. 19464	1952
Dr. Francis Drouet, Academy of Natural Sciences, Philadelphia, Pa. 19103	1961
Miss Elizabeth C. Earle, 132 Carlton Place, Media, Pa. 19063	1935
Mrs. Mark F. Emerson, 1437 Steel Rd., Havertown, Pa. 19083	1964
Mrs. Nellie Erisman, 5408-1A Bartram Drive, Philadelphia, Pa. 19143	1945
Mrs. Harold Evans, Awbury, E. Washington Lane, Philadelphia, Pa. 19138	1931
Mrs. W. Brooks Evert, 430 Thomas Ave., Riverton, N. J. 08077	1957
Carl W. Fenninger, 8304 Stenton Ave., Philadelphia, Pa. 19118	1947
Miss Elizabeth H. Flavell, 6146 Wayne Ave., Philadelphia, Pa. 19144	1946
Dr. John M. Fogg, Jr., 6807 Quincy St., Philadelphia, Pa. 19119	1921
Mrs. John M. Fogg, Jr., 6807 Quincy St., Philadelphia, Pa. 19119	1961
William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa. 19083	1956
Mrs. William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa. 19083	1956
Miss Julia W. Frick, 275 North Latch's Lane, Merion Station, Pa. 19066	1963
Dr. Thomas S. Githens, Cambridge Apts., Philadelphia, Pa. 19144	1945
Dr. Robert B. Gordon, 415 Sharpless St., West Chester, Pa. 19380	1942
Mrs. Robert B. Gordon, 415 Sharpless St., West Chester, Pa. 19380	1962
Mrs. Dorothy Graham, 1811 Addison St., Philadelphia, Pa. 19146	1964
John F. Gyer, Jessup Mill Rd., Clarksboro, N. J. 08510	1960
Louis E. Hand, Box 146, New Lisbon, N. J. 08064	1936
Mrs. J. Norman Henry, Gladwyne, Pa. 19035	1932
Miss Josephine de N. Henry, Gladwyne, Pa. 19035	1938
J. Norman Henry, Jr., 410 Mulberry Lane, Haverford, Pa. 19041	1956
R. L. Hill, Jr., 180 Drexel Ave., Lansdowne, Pa. 19050	1963
Mrs. R. L. Hill, Jr., 180 Drexel Ave., Lansdowne, Pa. 19050	1963

Mrs. John M. Huebner, 150 Anton Rd., Wynnewood, Pa. 19096	1958
Donald Iffland, 18 Pickwick Lane, Newtown Square, Pa. 19073	1964
Mrs. M. L. Kendig, 65 S. Main St., Manheim, Pa. 17545	1935
Miss Natalie B. Kimber, 538 E. Locust Ave., Philadelphia, Pa. 19144	1928
Dr. Lawrence J. King, Division of Natural Sciences, Dept. of Biology, State University College, Geneseo, N. Y. 14454	1963
Ludwig A. Koelnau, 850 N. 22nd St., Philadelphia, Pa. 19103	1952
Mrs. Ida K. Langman, 248 Harvey St., Philadelphia, Pa. 19144	1937
Dr. Hui-Lin Li, Morris Arboretum, Philadelphia, Pa. 19118	1944
Bayard Long, 250 Ashbourne Rd., Elkins Park, Philadelphia, Pa. 19117	1906
Mrs. Baldwin Lucké, 630 Rose Lane, Bryn Mawr, Pa. 19010	1965
Mrs. C. P. Mann, 905 Cherry Lane, Riverton, N. J. 08077	1957
Sidney Margolis, 1221 Wingohocking St., Philadelphia, Pa. 19140	1962
Mrs. Alfred Martin, Three Tuns, Ambler RD 3, Ambler, Pa. 19002	1961
James R. McGrath, 56 Whartman Rd., Graterford, Pa. 19426	1961
Mrs. Charles J. McKinney, 233 Rex Ave., Philadelphia, Pa. 19118	1961
Dr. Tilford D. Miller, 215 King Ave., Westmont, N. J. 08108	1962
Mrs. Tilford D. Miller, 215 King Ave., Westmont, N. J. 08108	1962
Miss Julia Moore, Mill Creek Rd., Chalfont, Pa. 18914	1963
Dr. Edwin T. Moul, Dept. of Botany, Rutgers University, New Brunswick, N. J. 08900	1945
A. Edward Murray, Jr., 70 Kraft Lane, Kenwood, Levittown, Pa. 19053	1960
Mrs. Edward Norman, 22 Pin Oak Drive, Lawrence Twp., Trenton, N. J. 08601	1961
Mrs. George P. Orr, Willow Brook Farm, Paoli, Pa. 19301	1935
Miss Elizabeth Orsatti, 7238 N. 20th St., Philadelphia, Pa. 19138	1962
William Overlease, Mill Rd., Box 144, R.D. 1, West Chester, Pa. 19380	1964
Walter Palmer, Route 35, Media, Pa. 19063	1952
Mrs. Frank Parker, 400 S. 45th St., Philadelphia, Pa. 19104	1950
Dr. Ruth Patrick, P.O. Box 4095, Chestnut Hill Sta., Philadelphia, Pa. 19118	1937
Mrs. Marguerita Phillips, 125 West Penn St., Philadelphia, Pa. 19144	1965
Mrs. Richard Philson, 321 Blaine Ave., West Berlin, N. J. 08091	1964
Harold W. Pretz, 123 S. 17th St., Allentown, Pa. 18100	1909
Dr. Charles W. Reimer, 856 Cricket Rd., Secane, Pa. 19018	1953
Dr. Robert Robbins, Temple University, Dept. of Radiology, Philadelphia, Pa. 19140	1954
Dr. Robert Robertson, 226 W. 2nd St., Moorestown, N. J. 08057	1960
Mrs. Robert Robertson, 226 W. 2nd St., Moorestown, N. J. 08057	1960
Miss Anne Rowland, 1276 Welsh Rd., Meadowbrook, Pa. 19046	1948
Mrs. Karl Rugart, 612 Bryn Mawr Ave., Penn Valley, Narberth, Pa. 19072	1942
Dr. Ralph M. Sargent, 4 College Circle, Haverford, Pa. 19041	1948
Mrs. Ralph M. Sargent, 4 College Circle, Haverford, Pa. 19041	1962
Dr. Robert L. Schaeffer, Jr., 30 N. 8th St., Allentown, Pa. 18100	1938
Dr. Alfred E. Schuyler, Academy of Natural Sciences, Philadelphia, Pa. 19103	1962
Miss Dorothy Scott, 2359 E. Cumberland St., Philadelphia, Pa. 19125	1959
Mrs. George R. Shaefer, 2976 Dorman Ave., Broomall, Pa. 19008	1963
Henry Singer, 2655 Summit Ave., Broomall, Pa. 19008	1963
Mrs. Walter Smedley, 409 Fairview Rd., Narberth, Pa. 19072	1963
Dr. Robert Speck, 737 Cedar Ave., Haddonfield, N. J. 08033	1964
James R. Steel, Jr., 1503 Shoemaker Rd., Abington, Pa. 19001	1961
Charles G. Stehle, 1714 Brook Rd., Rydal, Pa. 19046	1963
Mrs. Charles G. Stehle, 1714 Brook Rd., Rydal, Pa. 19046	1963

Dr. C. I. Stiteler, 507 Welsh St., Chester, Pa. 19013 1945
Mrs. George Stoops, Providence Rd., Media, Pa. 19063 1960
Miss Mary Sullivan, Montgomery Court L 23, Narberth, Pa. 19072 1954
Mrs. Edmond G. Thomas, 400 W. Springfield Ave., Philadelphia, Pa. 19118 1963
Miss Elizabeth Thorp, 403 S. 41st St., Philadelphia, Pa. 19104 1953
Robert J. Titherington, 6317 N. Norwood St., Philadelphia, Pa. 19138 1942
Charles H. Van Housen, 5022 Erringer Place, Philadelphia, Pa. 19144 1954
Jesse T. Vogdes, N. Lemon St., Media, Pa. 19063 1960
Mrs. Jesse T. Vogdes, N. Lemon St., Media, Pa. 19063 1958
Dr. Paul R. Wagner, 789 Main St., Collegeville, Pa. 19426 1935
E. Perot Walker, 3009 Park Rd., Lafayette Hills, Pa. 19444 1939
Mrs. E. Perot Walker, 3009 Park Rd., Lafayette Hills, Pa. 19444 1958
Albert J. Webb, 351 Oak Terrace, Wayne. Pa. 19087 1959
Dr. Lily A. Weierbach, 5220 Wayne Ave., Philadelphia, Pa. 19144 1958
Dr. Edgar T. Wherry, 228 Harvey St., Philadelphia, Pa. 19144 1925
Hans Wilkens, 424 S. 15th St., Reading, Pa. 19600 1928
David L. Williams, 501 E. Churchville Lane, Southampton, Pa. 18966 1963
Mrs. James B. Woodford, Cedar Run Lake, Marlton, N. J. 08053 1959
Mrs. H. Winfield Wright, 515 Folcroft Ave., Folcroft, Pa. 19032 1959

CORRESPONDING MEMBERS

Dr. Theodor P. Haas, Islander Hotel, 400 Seaside Ave., Waikiki, Honolulu, Hawaii 96815 1946
Charles E. Mohr, Nature Center, Kalamazoo, Michigan 49001 1959
Mrs. E. D. Rudolph, 300 West Lane, Columbus, Ohio 43201 1961
Dr. Harold St. John, Box 33, A.P.O. 143, San Francisco, Calif. 96343 1927
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich. 48104 1921
Dr. Heber W. Youngken, Massachusetts College of Pharmacy, Boston, Mass. 02115 1918

Program of Meetings

Date	*Subject*	*Speaker*	*Attendance*
Jan. 28	Preparing "The Southern Fern Guide"	Dr. Edgar T. Wherry	32
Feb. 25	A Naturalist in Dominica	Dr. Ruth Patrick	41
Mar. 25	Our Natural Heritage	Mrs. W. Brooks Evert	30
Apr. 22	Intriguing Plants in the Sedge Family	Dr. Alfred E. Schuyler	31
May 27	From Pyxie to Pines	Mrs. James B. Woodford	37
Sept. 23	Reports by Members on Summer Activities		20
Oct. 28	Cocoplums, Calabashes and Coconuts	Dr. Robert Robertson	34
Nov. 18	Vegetation Zonation in the E. C. Rockies	Dr. Philip R. Pearson, Jr.	30
Dec. 16	Wild Flowers of Mt. Desert Island, Maine	Dr. Edgar T. Wherry	42

Trips

Date	*Locality*	*Leaders*	*Attendance*
May 9	Early Azaleas, Gladwyne, Pa.	Mrs. J. Norman Henry	10
Oct. 31	The Pine Barrens in Autumn, Batsto, N. J.	L. E. Hand & E. T. Wherry	26
Dec. 31	Winter Botany, Graterford, Pa. (Tor. B. C.)	James R. McGrath (P.B.C.)	2

The Pine Barrens in Autumn: The Philadelphia Botanical Club Field Trip to Batsto, New Jersey, October 31, 1965.

October 31st was a perfect day for adventures afield, being colorful, clear, and warm after the first few nights of frost. The members and friends of the Club who met at Batsto were delighted to have as guides Lou Hand, Dr. Wherry, and Dr. Gordon, assisted by several others.

Along the Nature Trail and around Forge Pond, only the slender-stemmed Coast Jointweed, *Polygonella articulata*, and some New York Aster, *Aster novi-belgii*, were still blooming. Green was provided by the foliage of the Southern White-cedar, *Chamaecyparis thyoides* (with violet cones); Pitch Pine, *Pinus rigida* (with orange twigs); Short-leaf Pine, *P. echinata* (with blue-gray twigs); Inkberry, *Ilex glabra*; Sheep-laurel, *Kalmia angustifolia*; Pine Barren Sandwort, *Arenaria caroliniana*; and Pyxie, *Pyxidanthera barbulata*. The leaves of most of the heaths had turned to deep red: Low Blueberry, *Vaccinium vacillans*; Black Huckleberry, *Gaylussacia baccata*; Stagger-bush, *Lyonia mariana*; and Fetter-bush, *Leucothoë racemosa*. The leaves of Sand-myrtle, *Leiophyllum buxifolium*, were becoming dull purple, and the heath-like Hudsonia, *Hudsonia ericoides*, had a distinctly reddish-bronze cast at the top of the green-gray plants. In the too-dry bogs stood old fruiting stalks, a foot or more high and with lovely detail for a hand lens-view, of Golden-crest, *Lophiola americana* (dull gray-white); Redroot, *Lachnanthes tinctoria* (brownish-black); Meadow-beauty, *Rhexia* (with jug-shaped hypanthia); Ten-angled Pipewort, *Eriocaulon decangulare*; Bog Beard-grass, *Andropogon virginicus* var. *abbreviatus*; Broom Beardgrass, *A. scoparius*; and Bayonet-rush, *Juncus militaris*. Submerged in the dark waters of the streams were the long narrow chambered leaves of the sedge *Scirpus subterminalis*. Sought and found in the bogs were the tiny Curly-grass Fern *Schizaea pusilla* and the three Club-mosses, *Lycopodium carolinianum, L. alopecuroides,* and *L. chapmanii*. Besides several species of *Sphagnum* moss in the bogs, Hair-cap Moss, *Polytrichum commune*, was found on damp open sand, while *P. juniperinum* and Pincushion-moss, *Leucobryum*, occupied the drier sites. Of three conspicuous fungi, two were identified as *Laccaria trullisata* and *Scleroderma geaster*. The Tar-lichen, *Lecidea uliginosa* was conspicuous, as were various species of *Cladonia* in abundance.

At lunch, Dr. Wherry discussed the origin of the Pine Barren flora. He believes that, after the Tertiary seas withdrew from the Coastal Plain, plants from the higher parts of the southern Appalachian Mountains invaded the similar acid soils of the newly exposed land, and that soil character has been more important than temperature in controlling their distribution. The trip was concluded at the home of David Amato with an examination of the layer of solid bog iron (sandstone cemented with limonite) which presumably underlies all the bogs of the Pine Barrens. — M. R. ROBERTSON.

NOTICE, APRIL, 1966

The dues of the Philadelphia Botanical Club are now $3.00 per year. The subscription price of Bartonia is now being set at $2.00, the same charge being made for back numbers; all but Nos. 1, 7, and 14 are still available.

No. 36 1966

BARTONIA

JOURNAL OF THE PHILADELPHIA BOTANICAL CLUB

CONTENTS

Daniel Steinhauer, Early Ohio Plant Collector and his correspondence with the Botanist Schweinitz .... RONALD L. STUCKEY 1

The Philadelphia Botanical Club, 1966 24

PUBLISHED BY THE CLUB
ACADEMY OF NATURAL SCIENCES, 19TH & PARKWAY
PHILADELPHIA, PENNSYLVANIA 19103
Subscription Price, $2.00. Back Numbers, $2.00 each
ISSUED AUGUST 18, 1967

MISSOURI BOTANIC
SEP 20 196

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

No. 36 **1966**

Daniel Steinhauer, Early Ohio Plant Collector, and his Correspondence with the Botanist Schweinitz [1]

DR. RONALD L. STUCKEY [2]

Department of Botany and Plant Pathology, The Ohio State University

In Francis W. Pennell's classic monograph, "The Scrophulariaceae of Eastern Temperate North America" (1935b), there is recorded, in his reference list of collectors, a Daniel Steinhauer who obtained botanical specimens in Ohio and Pennsylvania. Examination of this monograph, however, shows Mr. Steinhauer cited as a collector of only one Ohio specimen, *Collinsia verna,* from Chillicothe in Ross County. Recent study of manuscript material and herbarium specimens in the Academy of Natural Sciences of Philadelphia has further elucidated some of the interesting aspects of this Ohio botanical pioneer. In the Academy holdings are three detailed letters and at least 51 Ohio plant specimens prepared in the years 1820-22 by Steinhauer and sent to one of the most active botanists of the time, the Rev. Lewis David von Schweinitz. On the basis of present knowledge of early botanical history in Ohio, these are believed to be the oldest extant herbarium specimens of Ohio plants collected by a resident of the state.[3]

---

[1] Paper No. 711 from the Department of Botany and Plant Pathology, The Ohio State University, Columbus 43210.

[2] The research for this paper was begun while I was a post-graduate instructor at the University of Michigan during the summer of 1965. During part of that time I was primarily engaged in a study of the herbarium of Charles W. Short at the Academy of Natural Sciences of Philadelphia. The latter project was made possible by a travel allowance from National Science Foundation grant in support of the systematic and evolutionary biology program of the University of Michigan.

BIOGRAPHICAL DATA ON STEINHAUER AND HIS EARLY YEARS IN AMERICA

According to Barnhart (1935), Daniel Steinhauer was born in 1785, in Wales, and died at Bethlehem, Pennsylvania, in 1852. He followed his brother Henry to America, and taught in various Moravian schools in Pennsylvania at Lancaster, Nazareth, and Bethlehem, and in Ohio at Zanesville and Chillicothe, although Barnhart erroneously referred to Newark rather than the latter town. During the spring and summer of 1839, he lived in Cheyneville, Louisiana, and collected plants, some of which were sent to the prolific plant collector and world-wide exchange-correspondent, Dr. Charles W. Short of Louisville, Kentucky.

Daniel Steinhauer's arrival in America is recorded in a letter written by Henry Steinhauer to Zaccheus Collins, well-known Quaker philanthropist and botanist of Philadelphia. On 14 February 1818, he wrote, "I had the pleasure last week of welcoming my Brothr. Daniel from England — he has much botanical ardour & health to back it." And in a later letter to Mr. Collins, 25 April 1818:

> "The tardiness of the season has prevented us [the Steinhauer brothers] from doing much in the re botanica as yet, but my Brother, whose fraternal affection brought him across the Atlantic on the first news of my illness, brings in from time to time specimens of the Cryptogamic classes which have employed us pretty well . . ."

In the same letter and one dated 23 May 1818, Henry outlined plans for excursions to examine the Natural History of the Poconos and the Jerseys, in which he urged that Daniel might take part. In a letter dated 5 October 1818, Daniel also corresponded with Mr. Collins on the subject of botany.

---

[3] Rev. Manasseh Cutler is considered to have collected the first specimens in Ohio at Marietta (Kellerman, 1899). Cutler was not a resident of the state, but made one visit to Ohio, staying from 19 August 1788 to 15 October 1788, at which time he collected some plants (Cutler and Cutler, 1888, Vol. 1, p. 391-413, Vol. II., p. 285). His herbarium subsequently was destroyed by fire (Day, 1901, p. 219).

Five well-known, but non-resident naturalists who collected plants before 1830 in Ohio were André Michaux, 1793-95, Thomas Nuttall, 1810, 1816, and 1818, David B. Douglass, 1820, C. S. Rafinesque, 1818-26, and Rev. Lewis D. von Schweinitz, 1823.

Dr. Daniel Drake began his residence in Cincinnati in 1807 and studied the botany of the Lower Miami Valley. Steinhauer refers to Drake's plant collection, but the whereabouts of any herbarium Drake may have prepared, if it still exists, is not known. Drake was in botanical communication with both Thomas Nuttall and Charles W. Short, but neither of them acquired his herbarium, although Short did obtain some of Drake's specimens collected from outside Ohio, which were prepared in connection with the latter's travels and studies for a book on the principal diseases of the interior valley of North America. These specimens are preserved in the Short Herbarium at the Academy. There is no reference to any collection of plants in the most recent biography of Drake (Horine, 1961).

The plants collected by Dr. S. P. Hildreth, who began his residence in Ohio at Belpré in 1806 and finally settled at Marietta in 1808, were deposited at Marietta College. They are no longer extant (Walp, 1951, p. 157).

These notes give us a clue that the Steinhauer brothers were both interested in botany, but with Henry's death a month later, in July, Daniel had to turn to other horizons in his botanical endeavor. During these early years in America, he apparently learned of Rev. von Schweinitz, but exactly when, where, or under what circumstances is not known. The present available biographical data do not indicate that the two gentlemen ever lived in the same neighborhood at the same time. It is probable that brother Henry may have played a role in bringing Daniel's attention to Schweinitz. In writing to Collins, 8 November 1817, Henry Steinhauer said, "The Bearer of this is my valued Friend Dr. Schweinitz . . ." From this note we know that Schweinitz visited in Bethlehem and Philadelphia, while in residence at North Carolina. Whether Schweinitz may have met Daniel Steinhauer personally on possible later visits to Bethlehem is not known. Daniel Steinhauer's three letters to Schweinitz preserved at the Academy are very personal ones, suggesting a close relationship, as if the two knew each other very well. Each one of these letters can be divided into three basic subjects: (1) His impression of Ohio with respect to its residents and his school, (2) his botanical pursuits including plants seen and collected, problems in identification, and his desire for companionship in the study of botany, and (3) his comments concerning relatives and mutual friends. Only the first two items are related in this paper.

Steinhauer's Residence and Schools in Ohio

Daniel Steinhauer, his wife, and sister-in-law (apparently Henry's wife) did not remain long in Bethlehem after Henry's death. In the summer of 1819 they moved to Zanesville, Ohio. What prompted the Steinhauers to leave Bethlehem for the Western Country remains only for speculation. Perhaps it was to establish his Moravian school in a completely different community. Furthermore, this decision afforded him another botanical horizon, for it gave him an opportunity to examine the vegetable productions in the relatively unexplored territory of the Upper Ohio Valley. After all, the year 1819 was only 26 years after André Michaux's excursion into the Western Country, nine years after Thomas Nuttall's journey into the Old Northwest, and only three years after the latter's first trip down the Ohio River. Many new species of plants resulted from these explorations. New species were still almost certainly to be found.

"The Muskingum Messenger," a weekly Zanesville newspaper, for Wednesday, 18 August 1819, documented their approximate arrival in Zanesville and the opening of their first school west of the Alleghenies. The newspaper printed the following advertisement, quoted here in part:

Female Education

Mr. & Mrs. Steinhauer,
From BETHLEHEM,

Beg leave to inform their friends and the public, that they intend to open a School for the instruction of

YOUNG LADIES,
IN ZANESVILLE,

towards the end of August, upon a similar plan with the justly celebrated establishment at Bethlehem.

Mr. S. being a member of the Church of Unitas Fratram (more generally known by the name of Moravian,) is thoroughly acquainted with their approved mode of conducting their Schools; the more so, as he has himself been engaged for many years in teaching in one of their most respectable academies in England.

Parents and Guardians, who are disposed to entrust Mr. & Mrs. Steinhauer, with the important charge of educating their children, may rest assured, that the strictest attention will be paid to their morals; and no efforts be wanting to insure the comfort, and to promote their advancement in every branch of their studies.

. . .

In the advertisement are listed a number of courses, including reading, writing, arithmetic, English grammar, history, geography, astronomy, bookkeeping, mathematics, botany, music, painting on velvet, drawing, and plain and ornamental needle work. Tuition for any one of these courses ranged from $3.00 to $6.00 per quarter. It is interesting to note that this extensive and varied curriculum included a course identified as botany, as opposed to more broadly defined courses, such as natural history, natural science, or natural philosophy, which were frequently used in this period.

The accounts of the travelers and early settlers are usually written from a positive viewpoint. Their records are often ones of happiness and excitement, although the hardships encountered may at times have been almost insurmountable. However, apparently life was not one of happiness and well-being for the Steinhauers in their western adventure. By May of the next year, after which two quarters of school had probably passed, we learn of Daniel's thoughts on his school and life in Zanesville, as recorded in the earliest of his preserved letters to Schweinitz. This letter is dated "Zanesville, May 17th 1820," and is addressed to Rev. L. D. Schweinitz at "Salem, Stokes County, N. Carolina." It began:

> "My dear Friend
>
> It is indeed high time that I should acknowledge the receipt of your kind favour of Jan^{y} 5th which afforded me much pleasure, & for which I intended to have thanked you ere now. Let me assure you, in the first place, that notwithstanding my negligence hitherto, there is no person on this side the Atlantic whose friendship I value more, or whose correspondence I should have greater pleasure in than yours. I thank you for your kind inquiries respecting my wife, my sister-in-law, & myself. We are all well in health, & busily engaged in the laborious occupation of instructing a set of children more stupid, & apparently more devoid of intellect than you can well imagine. We have had, & still have many difficulties to struggle with, though the inhabitants of Z. think we have surmounted them all, & are doing wonderfully well. At the close of our first quarter we received very pressing invitations from some of the most respectable inhabitants of Chillicothe, to remove to that place with the promise of much better encouragement & support than we had met with here. They engaged to secure to us 24 or 30 boarders, & as many day scholars as we chose to take. M^{rs} S. & I visited Chillicothe, & we were so much pleased both with the place & the inhabitants that we had well nigh resolved to remove thither. This we now report that we did not do, since the Zanesvillans (in whose vocabulary such words as honour, honesty, & probity, are not to be found), have not fulfilled the engagements which they entered into, to induce us to stay here."

However, by August their mind must have changed, for they did move to Chillicothe. In a history of Ross County, Ohio, Bennett (1902) mentioned in passing that "In 1820 or 1821 Mr. Stein[h]our, an Englishman, with his wife and sister-in-law began a school for girls . . ." "The Supporter," a Chillicothe newspaper, recorded the opening of their school in a much briefer fashion than did the Zanesville paper. The Wednesday edition for 25 October 1820 carried the following notice:

> FEMALE EDUCATION.
>
> THE public are respectfully informed that Mr. and Mrs. Steinhauer, intend to open their Academy for the reception of a limited number of Young Ladies, in a commodious house on Main street, Chillicothe, on the 1st of November next. Chillicothe, Oct. 25, 1820.

Life in Chillicothe must have proved somewhat more tolerable, but apparently it did not meet their fullest expectations. In the second letter to Schweinitz, dated "Chillicothe March 31st 1821," he said:

> "You have probably heard from Bethlehem that we made our escape from the *Villains* towards the end of August, & have established ourselves in Chillicothe, where our situation is in every respect more agreeable, though still, I must confess, not every thing I could wish it to be. The people with whom we are now connected are certainly a much more respectable set than the Villains whom we have left, but their progeny upon whom we are fated to labor are indeed more uncouth than you can well imagine. Of all domestic animals, in this western country, the children are those to whom there appears to have been paid the least attention, not excepting even the swine that run wild in the woods. We take only boarders, of whom we have at present 17, & expect to receive a few more in the course of the spring. You seem not to be aware that our labors are confined exclusively to the fair sex, as they are commonly termed, though these young Ohio nymphs, would perhaps better deserve the appellation of unlicked cubs. If their descendants are destined to become our future legislators, may they be blessed with more sapient heads & a more liberal position of intellect than their mothers!"

His feelings for teaching in Ohio are further elaborated in the third letter of "March 17th 1822:"

> "I feel much gratified by your friendly inquiries respecting my situation & prospects; that you wish me to write more at large on this subject is a convincing proof of your friendship. I believe you sincerely wish me well, & would rejoice to hear of my prosperity, but alas our situation & prospects are by no means such as I know you would wish them to be. To tell you the truth, I am, — & that with good reason, thoroughly disgusted with this western country & all that belongs to it, so much so that I am determined to leave it as soon as possible. No school *has* flourished in Ohio, & no school *will* flourish here till a total change takes place in the state of society & in the opinions of the inhabitants on the subject of education, & this must be a work of time. Nearly three years experience has now fully convinced us that nothing is to be effected here & made us to determine to establish ourselves elsewhere, as soon as may be . . ."

Later in the year 1822 the Steinhauers moved to Philadelphia.

STEINHAUER'S BOTANICAL RELATIONSHIP WITH SCHWEINITZ

We may suspect that Daniel Steinhauer kept a herbarium of his own, but I have not learned of its whereabouts should it still exist. What we know of his botanical work in Ohio is found in his letters and plant specimens sent to Schweinitz. In the first letter he wrote:

> "Though there is not a single botanist in Z. with whom I can associate, nor any one who pretends to have any knowledge of the subject, except a little doctor, who hardly knows an oak-tree from a toad-stool, yet my botanical ardour is not at all abated. Last year the want of my books, which had not come on, the excessive heat & drought, together with want of time, prevented me from doing any thing, but this spring I have been more diligent & though this is no botanical neighborhood my researches have not been quite unsuccessful. I will give you a list of such plants that I have found here, which I believe do not grow in the neighborhood of Bethlehem, some of them — I dare say most of them, you are well acquainted with. Polemonium reptans. Trillium grandiflorum. T. sessile. & T. obovatum. Uvularia grandiflora. Tradescantia Virginica. Silene Catesbaei. Delphinium exaltatum. Stellaria pubera. Pulmonaria [Mertensia] virginica. Hydrastis Canadensis. Sedum ternatum. *Collinsia verna* (a beautiful little annual). Caulophyllum thalictroides. Triosteum angustifolium. Lithospermum latifolium. Frasera Walteri [F. caroliniensis]. Turritis [Arabis] laevigata. Phalangium Quamashe [*sic*] [Camassia scilloides]. Hydrophyllum virginicum. Cynoglossum amplilexicaule [*sic*]. A species of Phacelia or Hydrophyllum which is certainly not described in Pursh [(1814)] or Nuttall [(1818)] — the filaments of the stamina are not bearded as in Hydrophyllum, but indeed the two genera are in my humble opinion not sufficiently distinct, & ought not to be separated. Vicia caroliniana. Phacelia fimbriata. Hesperis pinnatifida [Iodanthus pinnatifidus]. Specimens of all such in this list that I thought there was any chance of your wanting, I have preserved & will forward, if you wish it, by the first opp[ortunit]^y to Bethlehem. The Gymnocladus is found near Chillicothe & I have requested a person in that neighborhood to procure me specimens. I have noticed a number of queer looking plants, not yet in flower. I shall keep an eye upon them & let you know what they turn out to be."

Despite the lack of a botanical companion, Steinhauer seems to show moderate enthusiasm in searching for plants, even though his writing is full of apologies for not having been more productive. The list of plants gives us a good idea that he had a familiarity with the spring flora. There is, of course, the promise of sending specimens of some of the species that he found.

In the botanical portion of the second letter, he continued his apologies for not having studied the flora as thoroughly as possible. The letter began:

> "My dear Friend
>
> Your very kind, & truly welcome letter, of a date which I am ashamed to name, was duly received, & ought indeed to have been answered long ere now. At the time I received it, I hoped still to have made some botanical discoveries worth communicating to you before the close of the season, as well as to have forwarded the fruits of my researches for your acceptance & examination, but want of time to make extensions to any distance, excessive heat, & the sterailty [*sic*] of the country in the vicinity of that vile Zanesville, prevented me from procuring any thing worth mentioning, neither could I find any opportunity of sending you the plants that you wished for.

After an interlude of writing condemning the residents of Zanesville, and telling of his school in Chillicothe, as quoted previously, he continued with botany, saying:

> "Though the season was truly far advanced when we arrived here, I saw enough to convince me that I have to expect a pretty abundant harvest of new plants this summer, there is no comparison in that respect between the neighborhood of Zanesville & of this place. I am astonished to see so great a change in the vegetable kingdom in so short a distance, it is much greater than between Zanesville & Bethlehem. I am determined to make use of every spare moment in the ensuing summer, & you may rely upon it, though you have hitherto had nothing but promises. I will find means of sending you something worth while ere long. The winter has been unusually long & severe, the thermometer has been as low as 24° below 0. & even this week it stood one morning at 16 in consequence of which vegetation is very backward. I have notwithstanding already observed the little Hydrocotyle composita [Erigenia bulbosa] of Pursh in great abundance in the woods, & have preserved specimens for you. The Gymnocladus is very common in the woods here though I never saw it about Zanesville. You may judge of the quantity of Panax quinquefolium in this country when I tell you that one person of my acquaintance sent off no less than 1500 [hundred?] weight of it to Philadelphia for exportation to China last year. The Frasera Walteri [F. caroliniensis] grew at some distance from Zanesville & though I met with it before it was in flower, & after, yet I could not obtain specimens, but as it grows in this neighborhood, will not neglect to get it this season. Among the plants which you wish me to send you mention *Collinsia* verna, a new genus, called after Mr. Z. Collins of Philadelphia, & described & figured in the 1st vol. of the Journal of Acad. of Nat. Science; but not mentioned in Pursh [(1814)]. I have good specimens of it.

> I will with pleasure send you specimens of all my exotic grasses & ferns together with the New Holland plants in my collection, & if you will value it I will beg your acceptance of Brown's Prodromi Florae Novae Hollandiae. You are a much more thorough-going botanist than I, & it will consequently be in much better hands than mine. With regard to Lichens we have hardly any, & none but the most common Jungermanniae; comparatively few mosses, nor do I think many aquatics, though indeed I have not as yet had much opportunity of seeking for them. How happy should I be even of a Denke [4] to participate in my botanical pursuits, but I hear of no one at all interested in the subject in this state, except a Dr Drake in Cincinnati, with whom I intend to get acquainted. There is a little coxamical Yankey Doctor in Zanesville who has the name of being a very profound botanist, & was introduced to me as such, as a specimen of his knowledge, he came to me one day to inform me that he had discovered a beautiful plant with three petals, which he could not determine, & therefore thought it must be something new. I inquired whether he thought it might be a Trillium — Yes it might be a Trillium, but if not, it must be a Juncus, for it had the leaves of a Juncus. I immediately posted off to see it & to my astonishment found this supposed Trillium or Juncus to be no other than the well known Tradescantia virginica! Do you know that the Cyamus flavicomus [Nelumbo lutea] is found in the swamps of this country?"

In these words we again get the feeling that he desired companionship and help in his botanical endeavor, but yet when he did find someone, such as the Zanesville doctor, he was disappointed because of the doctor's inferior knowledge of botany. The citation of such authors as Pursh and Nuttall shows us that Steinhauer was familiar with the then recent American botanical literature.

In the third letter we learn that the promise to send some plants to Schweinitz has been fulfilled. He pointed out several plants that attracted his special attention, his desire to meet and obtain plants from Daniel Drake, and his contemplation of delivering some botanical lectures. He said:

> "I was glad to find that the box of plants had come to hand & had been deemed worthy of your acceptance. From the small number of western plants that I have furnished you with, you might suppose me to be a very lazy botanist, but the truth is, that section of the country into which I have been thrown is certainly very barren of plants, & I have hitherto had neither time nor opportunity to extend my researches far

---

[4] Steinhauer's reference to "Denke" may well have been to the Rev. Christian Frederick Denke, a Moravian clergyman and life-long botanical friend of Schweinitz. For a sketch of his life, see Barnhart (1926, p. 37).

from home. I will however, as I hope not to continue in this part of the country beyond the present summer, be as assiduous as possible in exploring it, & hope to be able to procure you a good number of the plants which you have mentioned as desiderata in your collection. Dentaria diphylla, I have not found here, but you have it at Bethlehem in the wood on the other side of the Lehigh, near the little spring, called Fenbrook's spring, at the foot of the stone quarry, the only spot in which I have observed it. It grows abundantly there, but neither the cattle or hogs eat it with avidity, & I never procured more than one specimen in flower. I am obliged to you for your observations on the plants which I requested you to name. You will wonder that I was not able to determine Stylophorum petiolatum, but I was so confident that it was a Chelidonium that I only compared it with the species contained in that genus, & finding it totally distinct from any described in Pursh or Nuttall I supposed it to be something new.

I was once introduced to Raffinesque [*sic*] in Philadelphia, but I do not feel much disposed to renew my acquaintance with him, nor do I think I should gain any thing by so doing. D^{r} Drake of Cincinnati is perhaps the only botanist in this country from whom any thing could be obtained; he has resided long in the western country & has I am told made a large collection of plants. I hope soon to have an opportunity of making his acquaintance, & will buy what can be got from him. I think I observed to you once before that I have never seen a country so barren in Cryptogamous plants as this is, I will notwithstanding collect what I can for you, though owing to my imperfect knowledge of the Mosses, Lichens &c of America I may perhaps send you many that are of no value. I shall be delighted to see your publication on the Jungermanniae of N. America, pray send it as soon as possible . . . What will you say when I tell you that I actually have it in contemplation to deliver a course of botanical lectures this spring? D^{r} Hays, a very intelligent physician in this town has solicited me to do so, & if we can get together a class, I think I shall attempt it, incompetent as I am to the task."

THE SCHWEINITZ HERBARIUM AND MANUSCRIPT CATALOGUE

The extensive herbarium of Rev. Lewis von Schweinitz, containing some 23,000 species of plants independent of fungi and other cryptogams, was acquired by his own collecting and through exchange with some 108 contributors. It came to the Academy after his death in 1834. Smith (1957) has pointed out that Schweinitz employed large books to preserve his specimens. The name of each species was written at the top of the page. The specimens of that species were strip-mounted on that page, often one over another when the page became crowded. With this arrangement original labels would have taken much space on the page. Thus, specimens received from his distinguished contemporaries were generally treated alike, their original labels uniformly discarded, and written alongside the specimen were one or two cryptic notes — one denoting the general area where the specimen was collected (*e.g.*, "Musk" or "Musking" for Muskingum) and the other naming the donor (*e.g.*, "Sthr" for Steinhauer). Occasionally one finds on a Schweinitz collection a note in a different handwriting. Careful study of this handwriting shows it to be that of Charles Pickering, who was curator of the Academy Herbarium when the Schweinitz Herbarium arrived. Pickering has preserved the original Schweinitz data by enclosing them with quotation marks, as in the following example for *Trillium*: "(herb Schw) sub nom. 'T. album var erecti Chilicothe Sthr.' " Under the leadership of John H. Redfield the specimens were taken from their original pages and mounted on standard herbarium sheets with the Schweinitz notes. Fortunately, Redfield was the most careful of conservators, and according to Pennell (1935a), "we may feel sure that he preserved whatever data could be found upon the folders . . ." Where specimens were crowded on the page, there is no assurance, however, that the notes pertain to the proper specimen. A mix-up regarding data and specimens appears to have happened a few times, and these situations are pointed out below in the list of Steinhauer's plants.

In addition to preparing his specimens in this manner, Schweinitz employed a huge yellow ledger in which he supposedly recorded systematically every specimen in his entire herbarium, along with the notation of the locality, the donor, or both.

In his catalogue the genera are arranged according to an artificial system similar to that of Linnaeus, the then popular method of arranging plants in lists. Each genus was assigned a number, beginning with one and continuing to the end of the list. Under each genus, each recorded species was given two numbers — one number beginning with one and continuing to the end of the catalogue and the second number designating the number for the species under each genus. For example, a portion is quoted for the genus *Trillium*, showing that *Trillium* was genus number 682, and that *T. sessile* was entry number 4331 for the entire catalogue and number 1 under the genus *Trillium* itself.

682 Trillium
    4331-1 sessile Salem Cherokee
    4332-2 lanceolatum LVS Cherokee Gambold
    4333-3 petiolatum Redriver Nuttall
    4334-4 pusillum Cherokee
    4335-5 obovatum Ohio Sthr Chilicothe [These locality data were crossed out by Schweinitz, and he later added] Georg[ia] B[aldwin].
    4336-6 viridescens Redriver Nuttall

The brief data in this manuscript catalogue can therefore be correlated with the cryptic notes on the plant specimens, and can give us a little more information for some of the specimens. The list of plants at the end of this paper is prepared in a manner to show the relationship of these two data sources.

The original set of entries for the catalogue was completed in March of 1830, and contained, according to Schweinitz's notes at the end of the catalogue, 11509 species of Phanerogams. These totals, however, are only about half the number reported actually to have been acquired by the Academy. From the published correspondence between Schweinitz and Torrey (Shear and Stevens, 1921) and the letters written to Schweinitz now preserved at the Academy, we know that Schweinitz obtained many specimens from both foreign and domestic correspondents after February 1831. Among the latter correspondents were John Torrey, Asa Gray, C. S. Rafinesque, Charles Pickering, and Lewis C. Beck. Additional specimens were also obtained through his own collecting in Ohio and Indiana during the late spring and early summer of 1831 and by the purchase of the extensive William Baldwin Herbarium in 1833. Schweinitz's record of these additions is very noticeable in his catalogue because the writing is now distinguishable by its finer and blacker strokes; whereas, entries before February 1831 have a faded brown appearance. Schweinitz either added the names of these donors beside an already existing name of a plant, or, if the plant represented a new or different species, its name was added to the already existing list, but given a more complex number. For example, see the entry under *Hydrophyllum* in the systematic list below. The reason for and the meaning of these complex numbers is still not understood. Since there were many additions to Schweinitz's Herbarium from February 1831 to the time of his death, it appears that its size could have been doubled by the time it came to the Academy.

In the systematic list below, I have given the entries of the Steinhauer plants in the Schweinitz Catalogue, including the number for the genus, the numbers for the species, the page number, and the data pertaining to Steinhauer's plants. Additional notes in his catalogue pertaining to specimens of other localities or donors have usually been omitted here to avoid confusion. At least eight of Steinhauer's specimens were thought by Schweinitz to represent new species, and he indicated them in his catalogue by placing his initials "LVS" following the proposed specific epithets. Furthermore, Schweinitz underlined these newly proposed specific epithets twice, whereas all other specific epithets were underlined only once. Schweinitz never published these proposed names. In order to avoid possible future bibliographic problems, I have replaced each of these unpublished names with several asterisks. Within quotation marks under each one of Schweinitz's entries, I have quoted the data that appear on the labels mounted with the plants. Steinhauer's plants are usually designated by the use of Steinhauer's name, often abbreviated "Sthr," accompanied with either "Ohio" or "Chilicothe" or both. The latter place name is always spelled with one "l." A comparison of the data on the specimens with information in the Schweinitz Catalogue shows that there is a surprisingly good correlation. After the plan set forth here, it therefore appears that similar and more extensive studies on the Schweinitz materials would be desirable. With reference to eastern North America, for example, those plants contributed by Thomas Nuttall, Asa Gray, C. S. Rafinesque, John Torrey, etc., are important because some of them represent possible duplicate specimens on which these authors based names of species. These type specimens have often gone unnoticed because of their cryptic data.

Although the data with the specimens and the data in Schweinitz's Catalogue are very brief, we can conclude that the plants probably came from the vicinity of either Zanesville or Chillicothe, since Steinhauer pointed out in his second and third letters that the want of time prevented him from extending his researches far from his residence. However, in attempting to determine what plants came from Zanesville or from Chillicothe, there is not always complete agreement when the data with the specimens and the data in the catalogue are compared with the information in Steinhauer's letters. In the first extant letter, Steinhauer prepared a list of plants he found in the neighborhood of Zanesville, and to Schweinitz he wrote: "Specimens of all such in this list that I thought there was any chance of your wanting, I have preserved & will forward . . ." Specimens of some of these same species are found in Schweinitz's Herbarium. We know from the letters that Steinhauer did not send any plants to Schweinitz until after he moved to Chillicothe. It therefore appears that Schweinitz, after discarding any labels that Steinhauer may have included and finally preparing his catalogue, considered most of these plants as coming from Chillicothe as this was Steinhauer's home address. Since Steinhauer was his only known contributor by correspondence from Ohio, the notation "Ohio" itself was often sufficient.[5] Under these circumstances we may be led to

[5] Schweinitz visited and collected plants in eastern Ohio in 1823 and 1831. It therefore has been necessary to separate the catalogue entries representing Schweinitz's own plants from Ohio from those entries representing plants sent by Steinhauer. The entries for plants obtained in 1831 can be spotted since the words were written in blacker ink; whereas, the 1823 collections are usually noted as "Musk," "Musking," or rarely by a specific name of a town. These abbreviations refer to Muskingum, and as implied by Schweinitz (Gerber, 1927, p. 268), it was the basin of the present Tuscarawas River in Tuscarawas County. Sometimes his Muskingum entries are followed by "ipse" or by the name "Hübner" or "Sam Hübner." In the summer of 1831 Schweinitz botanized with Rev. Samuel R. Hübner, pastor to the community of Gnadenhutten in Tuscarawas County (*loc. cit.*, p. 272). Since Schweinitz did not list Hübner as one of his 93 correspondents (Barnhart, 1935) and since there are no letters preserved from Hübner in the Schweinitz correspondence at the Academy, it appears that Hübner probably handed plants to Schweinitz personally. See also the information under *Allium* in the systematic list.

believe that some of Steinhauer's specimens may have come from Zanesville rather than Chillicothe. In the case where the distribution of the species in Ohio is limited to a particular portion of the state, it is possible to predict where the Steinhauer plant may have been collected. For example, *Trillium erectum,* a species of the non-calcareous soils of eastern Ohio, probably came from near Zanesville, but *Tradescantia subaspera* and *Synandra hispidula,* species known from southwestern Ohio, probably grew at Chillicothe. The *Gymnocladus dioica* must have come from Chillicothe, for Steinhauer wrote: "The Gymnocladus is very common in the woods here though I never saw it about Zanesville." Those species having been found at Zanesville, as noted by Steinhauer in his letters, are marked with an asterisk in the list below. The source localities for those plants not mentioned in his Zanesville list can not be considered on the present available data, and are therefore not marked.

STEINHAUER'S PLANTS IN THE SCHWEINITZ HERBARIUM

The following list of Steinhauer's plants is arranged according to Fernald (1950). My identifications and nomenclature are based on this manual, except in those cases where I have used the nomenclature and/or annotations of recent students of certain genera. Those few records of Steinhauer's plants in the Schweinitz Manuscript Catalogue that have not been substantiated by specimens are each noted here as "specimen not located."

ANGIOSPERMAE

MONOCOTYLEDONEAE

SPARGANIACEAE

Sparganium, No. 1477, p. 210
10994-3 *natans* . . . Ohio Sthr . . .
Specimen not located.

GRAMINEAE

Setaria, No. 171, p. 31
1211-5 *laevigatum* Ohio Sthr Specimina parca
Specimen not located.

CYPERACEAE

Rhyncospora [*sic*], No. 98, p. 18
695-20 *********** Chilicothe Ohio Sthr *******
******* "Schoenus (Rhynchosp[ora]) ********** Sthr Ohio" **R. macrostachya** Torrey

696-21 ******* Chilicothe Ohio Sthr

"Schoenus (Rhynchosp[ora]) ******* Sthr Ohio" **R. macrostachya** Torrey

Another specimen, "17. Schoenus fascicularis Ohio Sthr," has been annotated as "probably *Rhynchospora glomerata* (L.) Vahl" by Shirley Gale, 1941. This species, however, occurs on the Atlantic and Gulf Coastal Plains and inland to Tennessee, but is not known from Ohio (S. Gale. 1944. Rhodora 46: 112-115).

COMMELINACEAE

Tradescantia, No. 648, p. 89

4257-4 ******* Chilicothe Steinhauer

"Chilicothe Sthr" **T. subaspera** Ker-Gawl. var. **typica** [var. **subaspera**] (det. E. Anderson & R. Woodson, 1933).

JUNCACEAE

Juncus, No. 643, p. 88

4202-21 *biflorus* Ell. Ohio Steinhauer

"Juncus biflorus Ell Ohio Sthr" **J. pallescens** Lam. β **debilis** Engelm. (det. G. Engelmann), **J. acuminatus** Michx.

LILIACEAE

**Uvularia,* No. 639, p. 87

4158-3 *grandiflora* Chilicothe Sthr . . .

"Uvularia grandiflora Sthr Chilicothe" **U. grandiflora** Sm.

Allium, No. 593, p. 83

3968-20 ————— nova Species Muskingum Sam[uel] Hübner

Two specimens are mounted on the sheet, one with the label "Musk[ingum] Hübner" and the other "Ohio Sthr;"[6] both belong to the rare Ohio species, **Nothoscordum bivalve** (L.) Britt.

It is doubtful that there is any mix-up of labels regarding these specimens since we know that Steinhauer did have other plants of this species and that the data on Hübner's specimen agrees with the information in Schweinitz's Manuscript Catalogue. The exact localities of these plants remain in doubt, but it appears that they came from either Tuscarawas, Muskingum, or Ross counties.

---

[6] I have recently seen some of Daniel Steinhauer's specimens from Ohio in the William Darlington Herbarium at West Chester State University, West Chester, Pennsylvania. Among them is a specimen (an apparent duplicate) of *Nothoscordum bivalve,* with the only locality data being "Ohio."

I have recently pointed out the distribution of *N. bivalve* in Ohio (Stuckey, 1966). The only previous known records are two collections of 125 years ago from Champaign and Clark counties, and two collections taken within the past 35 years, some 90 miles farther south, in Adams County. The specimens in the Schweinitz Herbarium extend the distribution of this southern United States species into southeastern Ohio — the known northeastern-most limit of its total range. These historical specimens of 125-150 years ago from widely separated localities on the northern edge of the species total range presents an interesting phytogeographic problem in Ohio.

Erythronium, No. 611, p. 85

4069-4 *grandiflorum* Ohio Chilicothe

"4. Erythronium grandiflora Ohio Sthr" **E. americanum** Ker

4070-5 *********** Ohio & Philad[elphia] Steinhr.

Specimen not located.

**Anthericum* (*Phalang*[*ium*]), No. 627, p. 86

4114-1 *esculentum* (Phal[angium]) Ohio Steinhauer

"Phalangium [or] Anthericum Quamash esculentum Nuttall Ohio Sthr" **Camassia scilloides** (Raf.) Cory

Smilacina, No. 637, p. 87

4153-5 *ciliata* Chilicothe Sthr . . .

"Smilacina ciliata? Chilicothe" **S. stellata** (L.) Desf.

Trillium, No. 682, p. 91

4343-13 [*cernuum*] *album* . . . Ohio

"T. album var. erecti Chilicothe Sthr," as written by Pickering. **T. flexipes** Raf.

4341-11 *rhomboideum* (erectum) Ohio . . .

"Trillium erectum Ohio" **T. flexipes** Raf.

*4335-5 *obovatum* Ohio Sthr Chilicothe [The locality data have been crossed out by Schweinitz, and later he added] Georg[ia] B[aldwin]

"Trillium obovatum Sthr Chilicothe" **T. erectum** L.

ORCHIDACEAE

Cypripedium, No. 1457, p. 203

10545-3 *candidum* Chilicothe Ohio Sthr

"Cypripedium candidum In Prairies Ohio Sthr" **C. candidum** Muhl. (see photograph, plate 1)

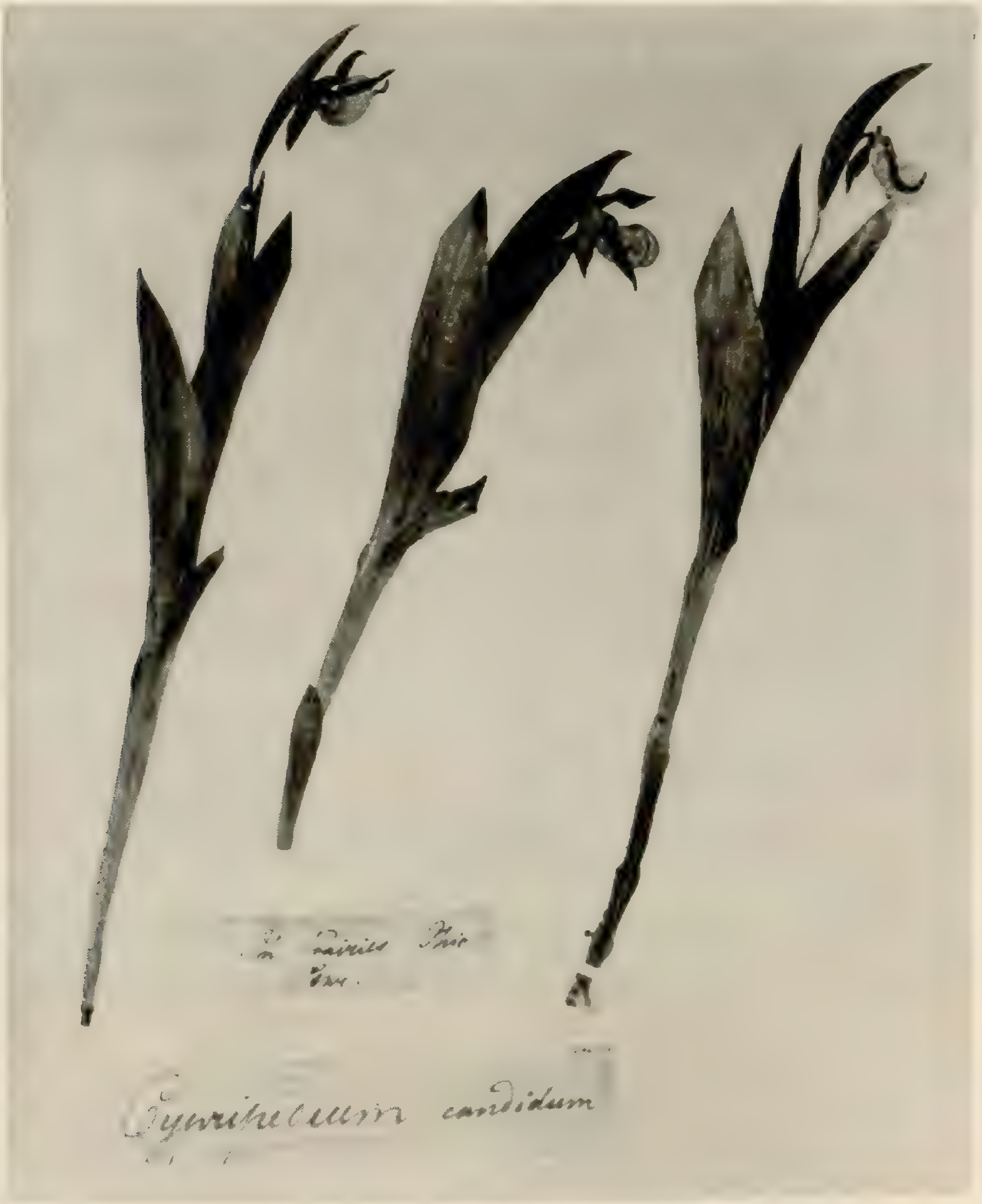


PLATE 1. Photograph of Daniel Steinhauer's specimen of *Cypripedium candidum* Muhl. The handwriting is that of Lewis David von Schweinitz. When Schweinitz owned the specimen the name of the plant appeared at the top of the sheet. Schweinitz's note, "In Prairies Ohio Sthr." would have been written beside the plant on the paper to which the plant was attached. These notes were later clipped from the original paper and mounted with the plants on the present standard size herbarium sheet. (Photo by Jay Sacks of the Academy of Natural Sciences.)

DICOTYLEDONEAE

PORTULACACEAE

Claytonia, No. 431, p. 66

2950-3 *caroliniana* (spathulata) Ohio Sthr . . .

Two specimens: "C. spathulata Caroliniana Ohio Sthr," as written by Pickering and "Ohio Sthr." Schweinitz doubtless separated the collections because the former has rather large linear-oblanceolate leaves; the latter very narrow linear leaves. Both are **C. virginica** L.

CARYOPHYLLACEAE

Silene, No. 828, p. 108

5290-47 *Catesbaei* Ohio Steinhauer

"Ohio Sthr" **S. virginica** L. (det. B. Maguire & C. L. Hitchcock, 1941).

RANUNCULACEAE

Ranunculus, No. 945, p. 125

6174-25 ********** . . . [No Ohio locality listed].

"Ranunculus ********** Ohio Sthr" **R. pusillus** Poir.

Anemone, No. 951, p. 126

6265-20 *pensylvanica* Ohio Sthr . . .

"Anemone pensylvanica Ohio Sthr Chilicothe" **A. canadensis** L.

Delphinium, No. 927, p. 123

6060-12 *tricorne* Ohio Sthr . . .

"Delphinium tricorne Ohio Sthr" **D. tricorne** Michx.

**Hydrastis,* No. 948, p. 126

6239-1 *canadensis* . . . [No Ohio locality listed].

"Hydrastis canadensis Ohio Sthr" **H. canadensis** L.

BERBERIDACEAE

Jeffersonia, No. 715, p. 95

4581-1 *diphylla* Ohio . . .

"1. Jeffersonia diphylla Chilicothe Sthr" **J. diphylla** (L.) Pers.

PAPAVERACEAE

Stylophorum, No. 899, p. 120

5907-2 *ohiense* (petiolat[um]) Sthr Ohio . . .

"Stylophorum petiolatum Nuttall [The epithet is crossed out and written above it is] diphyllum Ohio Sthr" **S. diphyllum** (Michx.) Nutt.

Corydalis, No. 1183, p. 156
8041-19 *tenuifolia* Ohio Sthr
"C. tenuifolia Ohio Sthr No. 11," as written by Pickering. **Dicentra canadensis** (Goldie) Walp.

CRUCIFERAE

**Hesperis,* No. 1125, p. 145
7383-8 *pinnatifida* Ohio Sthr . . .
"H. pinnatifida Musking," as written by Pickering. **Iodanthus pinnatifidus** (Michx.) Steud.

Cardamine, No. 1117, p. 143
7294-17 ———————— Ohio Sthr
"Cardamine pensylvanica Ohio" **C. pensylvanica** Muhl.

ROSACEAE

Rosa, No. 896, p. 119
5888-31 *rubifolia* Ohio Steinhauer
"Rosa rubifolia Ohio Sthr" **R. setigera** Michx.

LEGUMINOSAE

Gymnocladus, No. 783, p. 102
4913-1 *canadensis* Ohio Sthr . . .
"Gymnocladus canadensis Ohio Sthr" **G. dioica** (L.) Koch

Psoralea, No. 1202, p. 159
8301-9 *onobrychis* . . . Ohio Sthr
Specimen not located.

LINACEAE

Linum, No. 582, p. 82
3906-22 *virginianum* . . . [No Ohio locality listed].
"Linum virginicum Ohio Sthr" **L. striatum** Walt.

GUTTIFERAE

Hypericum, No. 1271, p. 172
9089-6 *pyramidatum* . . . Ohio . . .
"Hypericum (macrocarpum) pyramidat[um] Ohio Sthr" **H. pyramidatum** Ait.

LYTHRACEAE

Lythrum, No. 847, p. 112
5454-3 *alatum* . . . Ohio
"Lythrum (virgatum) alatum Ohio Sthr" **L. dacotanum** Nieuw. (L. H. Shinners. 1953. Field Lab. 21: 86).

UMBELLIFERAE

Eryngium, No. 493, p. 73

3308-8 *virgatum* (ovalifol[ium]) . . . [No Ohio locality listed].

"Eryngium ovalifolium virgatum Ohio Sthr" **E. integrefolium** Walt., a species which occurs on the Coastal Plain from Florida to Texas, and not in Ohio (C. R. Bell. 1963. Castanea 28: 78). This apparently represents a mix-up in labels.

Erigenia, No. 501, p. 73

3339-1 *composita bulbosa* . . . Ohio . . .

"Erigenia bulbosa Nuttall Ohio Sthr" **E. bulbosa** (Michx.) Nutt.

Sabbatia [*sic*], No. 331, p. 55

2377-13 ———————— Ohio Sthr

"Sabbatia [*sic*] Ohio Sthr," as written by Pickering. **Sabatia brachiata** Ell., a species which occurs in southeastern Virginia, south into Georgia and westward to southern Missouri and Louisiana (R. L. Wilbur. 1955. Rhodora 57: 29-33). This apparently represents a mix-up in labels.

HYDROPHYLLACEAE

**Hydrophyllum,* No. 317, p. 53

18717-12674-3 ———————— Ohio Sthr [Entry added later; therefore the different numbering system].

"Ohio Sthr" **H. virginianum** L.

Nemophilla, No. 318, p. 53

2265-3 ————————? Ohio Steinhauer . . .

"Hydrophyllum Chilicothe Sthr" **H. macrophyllum** Nutt.

Phacelia, No. 337, p. 55

*2387-2 *fimbriata* Chilicothe Sthr

"Phacelia fimbriata Ohio Sthr" **P. purshii** Buckl. (det. L. Constance, 1947).

2388-3 *bipinatifum* [*sic*] Ohio Sthr [The latter word crossed out].

Specimen not located.

Eutoca, No. 319, p. 53

2270-5 ********* Chilicothe Sthr

"Phacelia ******** Chilic D Sthr" **Hydrophyllum appendiculatum** Michx.

BORAGINACEAE

**Lithospermum,* No. 301, p. 50

2137-5 *latifolium* . . . Ohio Sthr

"L. officinale Sthr Oh," as written by Pickering. **L. officinale** L.

VERBENACEAE

Lippia, No. 1009, p. 133

6754-5 *lanceolata* Chilicothe

"Chilicothe Sthr" **L. lanceolata** Michx.

LABIATAE

Synandra, No. 974, p. 129

6445-1 *grandiflora* Chilicothe Sthr . . .

"Synandra grandiflora Chilicothe Sthr" **S. hispidula** (Michx.) Britt.

Stachys, No. 996, p. 132

6657-15 *media* Nuttall Ohio Sthr

"S. media Nut. Penns[ylvania] vel Ohio," as written by Pickering. **S. hispida** Pursh (det. C. Epling, 1932).

6655-13 *aspera* . . . Ohio Sthr

"S. aspera Ohio Sthr," as written by Pickering. **S. nuttallii** Shuttlew. (det. C. Epling, 1931).

In his paper, however, Epling (Fedde Repert. Sp. Nov. Beih. 80: 66. 1934) did not record *S. nuttallii* from Ohio. Owing to the nature of the handling of the data on the Steinhauer plants, this specimen may not have come from the state. No records or reports of *S. nuttallii* in Ohio are known. Fernald (1950) wrote that its status in eastern United States was in need of verification.

6659-17 *sylvatica* . . . Ohio Sthr

Specimen not located.

6674-32 ———————— Ohio Sthr *glabra*

Specimen not located.

Galeopsis, No. 991, p. 131

6600-5 *Tetrahit* . . . Ohio Sthr French Creek

The Ohio specimen not located; a specimen does exist from French Creek.

Three specimens, however, were found which Schweinitz may have considered belonging to any of the above mentioned three species, but it has been impossible to correlate the data. These are:

"Ohio" **Teucrium canadense** L. (det. E. McClintock, 1945).

"Ohio" **Scutellaria incana** Spreng. (det. C. Epling, 1938).

"Ohio Sthr," as written by Pickering. **Blephilia hirsuta** (Pursh) Benth.

SCROPHULARIACEAE

***Conobea* (Collinsia), No. 1024, p. 134

6003-1 *verna* . . . Chilicothe

"Collinsia verna Chilicothe Sthr" **C. verna** Nutt. (det. F. W. Pennell, 1924).

Seymeria, No. 1048, p. 138

7014-1 *macrophylla* Zoar Tuscarawas [County, Ohio]

"Seymeria macrophylla Chilicothe" A situation where the data in Schweinitz's Catalogue do not agree with the data on the label for the specimen. **Dasistoma macrophylla** (Nutt.) Raf. (det. F. W. Pennell, 1914).

Gerardia, No. 1043, p. 137

7006-19 ********* . . . [No Ohio locality listed].

"Gerardia ********* Chilicothe Sthr" **Aureolaria laevigata** (Raf.) Raf. (det. F. W. Pennell, 1914).

ACANTHACEAE

Ruellia, No. 1064, p. 139

7059-9 ******* Chilicothe

Specimen not located.

CAPRIFOLIACEAE

Triosteum, No. 410, p. 64

2832-1 *perfoliatum* . . . Ohio

"Ohio Sthr" **T. perfoliatum** L.

VALERIANACEAE

Valeriana, No. 62, p. 13

513-15 *pauciflora* Ohio Sthr

"Valeriana pauciflora Ohio Sthr" **V. pauciflora** Michx.

CAMPANULACEAE

Campanula, No. 402, p. 63

2759-25 *acuminata* . . . Chilicothe

"Campanula acuminata Chilicothe" **C. americana** L.

COMPOSITAE

Liatris, No. 1294, p. 177

11486-21 ———————— . . . Ohio

"Liatris Sthr Ohio," as written by Pickering. **L. spheroidea** Michx.

Polymnia, No. 1386, p. 193

10148-2 *canadensis* . . . [No Ohio locality listed].

"Ohio" **P. canadensis** L.

Acknowledgments

To Dr. Alfred E. Schuyler of the Academy of Natural Sciences of Philadelphia, I am especially indebted for his interest and encouragement during the course of my stay and study in Philadelphia, and his subsequent reading of the manuscript. To Dr. Edward G. Voss of the University of Michigan, I am grateful for aid in seeking funds, critical reading of the manuscript, and continued interest. Dr. Warren H. Wagner, Jr. of the University of Michigan has also aided in securing funds for my initial work at the Academy. The Schweinitz Catalogue and all letters cited in the references below are part of the manuscript collection in the Library of the Academy of Natural Sciences of Philadelphia. I am thankful to Mrs. Venia T. Phillips and Mrs. Cynthia D. Meyer for making these available for me to study. The Zanesville and Chillicothe newspapers were made available by the Ohio Historical Society Library, Columbus.

References

Anonymous. 1819. Female Education. The Muskingum Messenger [Zanesville, Ohio]. Vol. 10, No. 28. Aug. 18.

———. 1820. Female Education. The Supporter. [Chillicothe, Ohio]. Vol. 12, No. 627. Oct. 25.

Barnhart, John Hendley. 1926. Brief sketches of some collectors in the Barton herbarium. Bartonia 9: 35-42.

———. 1935. The botanical correspondents of Schweinitz. Bartonia 16: 19-36.

Bennett, Henry Holcomb, [ed.] 1902. The County of Ross [or] A History of Ross County, Ohio, from the Earliest Days, with Special Chapters on the Bench and Bar, Medical Profession, Educational Development, Industry and Agriculture and Biographical Sketches. Selwyn A. Brant, Madison, Wis. 736 pp.

Cutler, William Parker, and Julia Perkins Cutler. 1888. Life Journals and Correspondence of Rev. Manasseh Cutler, LL.D. 2 Vols. Robert Clarke & Co., Cincinnati. 524 pp. and 495 pp.

Day, Mary A. 1901. The herbaria of New England. Rhodora 3: 67-71, 206-208, 219-222, 240-244, 255-262, 281-283, 285-288.

Fernald, Merritt Lyndon. 1950. Gray's Manual of Botany. 8th ed. American Book Co., New York. lxiv + 1632 pp.

Gerber, Adolf, [tr.] 1927. The journey of Lewis David von Schweinitz to Goshen, Bartholomew County, in 1831. Indiana Hist. Soc. Publ. 8: 205-285.

Horine, Emmet Field. 1961. Daniel Drake (1785-1852): Pioneer Physician of the Midwest. Univ. Pennsylvania Press, Philadelphia. 425 pp.

Kellerman, W. A. 1899. Observations of the Ohio flora. (Abstract). 7th Ann. Rept. Ohio Acad. Sci. 35-37.

Nuttall, Thomas. 1818. The Genera of North American Plants, and a Catalogue of the Species, to the Year 1817. 2 Vols. Printed for the author by D. Heartt, Philadelphia. 312 pp. and 254 pp. + index, eratum [*sic*], and additions.

Pennell, Francis W. 1935a. The botanist Schweinitz and his herbarium. Bartonia 16: 1-8.

———. 1935b. The Scrophulariaceae of Eastern Temperate North America. Acad. Nat. Sci. Phila. Monogr. No. 1. 650 pp.

Pursh, Frederick. 1814. Flora Americae Septentrionalis; or, a Systematic Arrangement and Description of the Plants of North America. 2 Vols. White, Cochrane, and Co., London. 751 pp. + 24 pl.

SCHWEINITZ, LEWIS DAVID VON. [Systematically Arranged Catalogue of the Schweinitz Herbarium]. Manuscript, unpublished.

SHEAR, C. L., AND NEIL E. STEVENS, [ed.] 1921. The correspondence of Schweinitz and Torrey. Mem. Torrey Bot. Club 16: 119-300.

SMITH, C. EARLE, JR. 1957. A century of botany in America. Bartonia 28: 1-31.

STEINHAUER, DANIEL. 1818. Letter to Zaccheus Collins, Oct. 5, from Bethlehem, Pennsylvania.

———. 1820. Letter to Lewis D. Schweinitz, May 17, from Zanesville, Ohio.

———. 1821. Letter to Lewis D. Schweinitz, Mar. 31, from Chillicothe, Ohio.

———. 1822. Letter to Lewis D. Schweinitz, Mar. 17, from Chillicothe, Ohio.

STEINHAUER, HENRY. 1817. Letter to Zaccheus Collins, Nov. 8, from Bethlehem, Pennsylvania.

———. 1818. Letter to Zaccheus Collins, Feb. 14, from Bethlehem, Pennsylvania.

———. 1818. Letter to Zaccheus Collins, Apr. 25, from Bethlehem, Pennsylvania.

———. 1818. Letter to Zaccheus Collins, May 23, from Bethlehem, Pennsylvania.

STUCKEY, RONALD L. 1966. The botanical pursuits of John Samples, pioneer Ohio plant collector (1836-1840). Ohio J. Sci. 66: 1-41.

WALP, RUSSELL LEE. 1951. Riddell's notice of vegetable productions growing spontaneously in Washington County, Ohio. Ohio J. Sci. 51: 320-334.

The Philadelphia Botanical Club, 1966

DR. EDGAR T. WHERRY, *Honorary President*

DR. WALTER M. BENNER, *President*
DR. RALPH M. SARGENT, *Vice President*
MRS. ROBERT ROBERTSON, *Secretary*
MR. WILLIAM L. FREYBURGER, *Treasurer*
MR. BAYARD LONG, *Curator*
DR. EDGAR T. WHERRY, *Editor*

Changes in the Membership List during 1966

NEW MEMBERS

DR. DONALD W. CRITTENDEN, 21 Temple Ave., Sellersville, Pa. 18960
MISS PHOEBE CROSBY, 105 East Mill Rd., Flourtown, Pa. 19031
DR. J. ZERN HEBERLING, 206 Market St., Bangor, Pa. 18013
DR. STEVENS HECKSCHER, Dept. of Mathematics, Swarthmore College, Swarthmore, Pa. 19081
FRANK HOCHGESANG, 422 Edgemoor Drive, Moorestown, N. J. 08057
MRS. FRANK HOCHGESANG, 422 Edgemoor Drive, Moorestown, N. J. 08057
MRS. LAWRENCE E. JEWETT, P. O. Box 26, Newtown Square, Pa. 19073
DR. JACK MCCORMICK, 1005 Millbrook Rd., Newtown Square, Pa. 19073
WILLIAM SIPPLE, 918 Clements Bridge Rd., Runnemede, N. J. 08078
JOHN WOLF, 44 High St., Sharon Hill, Pa. 19079

CHANGES OF ADDRESS

Mrs. Nellie A. Erisman, 218 W. Abbottsford Ave., Philadelphia, Pa. 19144
Miss Elizabeth H. Flavell, 69 S. College Ave., Flourtown, Pa. 19031
Donald Iffland, 155 Cricket Ave., Ardmore, Pa. 19003
Sidney Margolis, Park Drive Manor, Apt. 703 B, Lincoln Dr. & Harvey St., Philadelphia, Pa. 19144
Mrs. Alfred Martin, Orchard Lane, Three Tuns, Ambler, Pa. 19002
Mrs. Frank Parker, 402 S. 45th St., Philadelphia, Pa. 19104
Miss Anne Rowland, 114 Avon Rd., Haverford, Pa. 19041
Henry Singer, 3511 Goshen Rd., Newtown Square, Pa. 19073
Dr. C. I. Stiteler, 901 E. 20th St., Chester, Pa. 19013
David L. Williams, 6 Brookside Rd., Wallingford, Pa. 19086

DECEASED

Mrs. A. C. Barnes	April 29, 1966
Dr. Thomas S. Githens	April 10, 1966
Robert J. Titherington	October 8, 1966

Program of Meetings

Date	*Subject*	*Speaker*	*Attendance*
Jan. 27	The Compositae, a selective study of the Daisy Family in the eastern U. S.	Dr. Ralph M. Sargent	31
Feb. 24	No meeting — snowed out		
Mar. 24	Secret in the Hive (film)	Mr. Henry Singer	
	The Sedge Genus *Fimbristylis* in the Philadelphia Area	Dr. Alfred E. Schuyler	27
Apr. 28	A Naturalist in Puerto Rico: Camera Studies in a Tropical Rain Forest	Dr. Stevens Heckscher	32
May 26	Vegetation and Fire in the Pine Barrens	Dr. Jack McCormick	34
Sept. 22	Reports by Members on Summer Activities		31
Oct. 27	Some European Botanical Gardens	Dr. John M. Fogg, Jr.	32
Nov. 17	Flora and Fauna of Historic Batsto	Mr. Louis E. Hand	42
Dec. 15	Wild Flowers Worth Cultivating	Dr. Edgar T. Wherry	44

Trips *

Date	*Locality*	*Attendance*
Feb. 27	The Pine Barrens in Winter	28
Apr. 30	The Plains of the Pine Barrens in Spring	20
June 5	In Torrey's Footsteps to Quaker Bridge	23
July 10	The Pine Barrens in Summer	11
Oct. 2	Fall Flowers in the Pine Barrens	19

* These trips have been planned and led by Dorothy (Mrs. W. B.) Evert, with the assistance of Louis E. Hand, Edgar T. Wherry, and others. In now retiring from the chairmanship of the Club's Trip committee, she wishes to express her appreciation of the support received from the members.

"In Torrey's Footsteps" The Philadelphia Botanical Club Field Trip to the Pine Barrens, June 5th, 1966.

After a cold, late Spring, real Summer weather greeted the twenty-three members and friends of the Club when they met at Atsion Bog, Burlington County, New Jersey. Billowy white clouds floated in the clear blue sky and it was a perfect day to go "Bog-trotting". The small pond — frequently dry in summer — was quite full of water and showed young plants of mermaid weed, *Proserpinaca pectinata,* and submerged leaves of the bladderworts, *Utricularia spp.* A large northern pine snake, *Pituophis melanoleucus melanoleucus,* graced the perfect summery scene when he swam across the pond in full view of most of the group. Ipecac spurge, *Euphorbia ipecacuanhae,* showed its varying colorations, some plants quite green and others an exquisite, rich maroon. The black chokecherry, *Pyrus melanocarpa,* was in bloom. Doctor Wherry pointed out its smooth, shiny leaves, a valuable aid in identification when not in bloom. Sand Myrtle, *Leiophyllum buxifolium,* and heathlike Hudsonia, *Hudsonia ericoides,* with their white and yellow bloom respectively, colored the drier parts of the area. The lovely blue stalks of toadflax, *Linaria canadensis,* stood tall and straight; its cleistogamous characteristics were shown us. The blue-eyed grass, *Sisyrinchium atlanticum,* vied with the blue of the toadflax for our attention. Lance-leaved violets, *Viola lanceolata,* were in full flower and a few primrose-leaved violets, *Viola primulifolia,* still blossomed. The always fascinating insectivorous plants, pitcher *Sarracenia purpurea,* and two sundews, *Drosera filifornis* and *D. intermedia* were observed.

Following in John Torrey's footsteps — though in modern vehicles — we took the Atsion-Quaker-Bridge road, stopping at an abandoned cranberry bog where Dr. Wherry discussed the interesting pattern of succession. The area shows invading swamp red maples, *Acer rubrum* var. *trilobum,* and pitch pine, *Pinus rigida.* The invading pine seems always to be *P. rigida,* never *P. echinata.* Broad-leaved chain fern, *Woodwardia virginica,* showed its red pigmentation — a spring characteristic of this plant. Walter's sedge, *Carex walteriana,* was abundant.

A cool shaded pine-grove — including some *P. echinata* — overlooking the Atsion creek (or Mullica river) accompanied by a large colony of lupine, *Lupinus perennis,* in perfect bloom favored a "pause that refreshes". During the lunch period the new proposed Pine Barrens National Monument brochure was presented, and the project discussed by Brooks Evert. The area concerned is an extremely valuable one, being one of the last near-wilderness sections in the spreading eastern megalopolis: a choice area for study and education in natural ecosystems, a valuable water recharge area and a recreational resource. The group appreciated the great potentials of this project and offered helpful support.

The history of Quaker Bridge was brought alive with Dr. Wherry's remarks as we stood on the present bridge over the Batsto River. In this area many plants were collected by early botanists, several old herbarium sheets in the Academy's local herbarium bearing the legend "Quaker Bridge". Notably it was here that curly grass fern, *Schizaea pusilla,* was first discovered. Beautiful sour gums, *Nyssa sylvatica,* blue green magnolias, *Magnolia virginiana,* sweet pepper-bush, *Clethra alnifolia,* and the swamp azalea, *Rhododendron viscosum,* gave the banks of the river its varying hues of green. Clumps of the marsh fern, *Thelypteris palustris,* the net-veined chain fern, *Lorinseria areolata,* royal fern, *Osmunda regalis,* and cinnamon fern, *Osmunda cinnamomea,* gave us an opportunity to observe their characteristics.

There is not often given to a tour manager and parking director an opportunity to show such an experienced botanist as Dr. Wherry a plant new to him, but this was the climax of a glorious day! The orchid *Arethusa bulbosa* is well known to grow in the sphagnum bogs at Quaker Bridge, and it had been planned to complete our trip by viewing these beautiful flowers at their peak of bloom; what we did not know, however, was that a perfect albino one, *A. bulbosa* forma *albiflora* awaited us, a discovery by Brooks Evert, a fitting close to the day.

Summer Bloom: The Philadelphia Club Field Trip to the Pine Barrens, New Jersey, July 10th, 1966.

After a week of record-breaking high temperature, eleven members and guests braved the heat and explored the Pine Barrens for Summer Bloom. The rewards were great.

Our first stop at Martha's Furnace produced some interesting Pteridophytes, the features of which were discussed by Dr. Edgar T. Wherry. The fertile fronds of the adder's tongue fern, *Ophioglossum vulgatum,* were just beginning to mature. Two grape ferns, *Botrychium virginianum* and *B. dissectum* were noted. The marsh fern, *Thelypteris palustris,* with its thinnish, blue green fronds, was in great abundance. Nearby were graceful plants of the lovely royal fern, *Osmunda regalis.* For at least one member, heretofore confused by the superficial likeness of sensitive fern, *Onoclea sensibilis,* and net-veined chain fern, *Lorinseria areolata,* they will hereafter, hopefully, be known apart by alliteration: *Onoclea sensibilis* leaf-lobes are opposite, (whereas those of *Lorinseria areolata* are alternate) so by the simple device of noting the initial letter o (Onoclea-opposite), confusion should cease.

Nuttall's lobelia, *Lobelia nuttallii,* was still in bloom and the charming pink flowers of the thread-leaved sundew, *Drosera filiformis,* were wide open in the morning light. Though its bloom was past we were able to locate and observe the developing fruit of the small twayblade, *Liparis loeselii.*

Even had we not known of the former existence of the town of Martha — now a ruin — we would have realized that we were in an area of past civilization, with the evidence of resulting soil enrichment given by introduced species, such as catalpa trees, *Catalpa bignonioides,* from the midwest, and ebony spleenwort, *Asplenium platyneuron,* native outside the Pine Barrens.

A short drive took us to Calico Ridge for lunch, where the cooling breezes and shade from the pines and oaks refreshed us for further exploration.

A walk down the hillside brought us to water's edge. Here along the Oswego river, gingerly proceeding through the squishy, sphagnum-covered fringe, we observed stands of bog asphodel, *Narthecium americanum,* and gold-crest, *Lophiola americana,* in full bloom, as well as a few grass-pinks, *Calopogon pulchellus.* By crossing on old logs we were able to reach a small island — sandy at one end where the river current packs the soil firmly, but again ticklish walking at the downriver side. The search for the rare — in New Jersey — reversed bladderwort, *Utricularia resupinata,* was rewarded. After the group had been shown how to stoop and squint along the water surface to locate this minute plant there were cries of "I see one" as individuals focused their eyes on the odd tiny pink flower.

The scratchy, rough road up river to Buck Run was worth any car-scratch that may have ensued. Here where the Buck Run stream enters the Oswego river is a beautiful bog garden. The varying shades of yellow are the result of huge stands of bog asphodel, *Narthecium americanum,* and hooded bladderwort, *Utricularia cornuta,* softened by gold-crest, *Lophiola americana,* with its lovely tiny golden flowers framed in white down.

Pipeworts, *Eriocaulon septangulare,* and sundews *Drosera spp.* were overstoried by the lovely fragrant swamp azalea, *Rhododendron viscosum,* while under the edging white cedar trees, *Chamaecyparis thyoides* the internationally famous plant of the Pine Barrens, curly grass fern, *Schizaea pusilla,* was much admired and photographed. At this date the fertile fronds are just developing.

A bend in Buck Run stream almost surrounded by water-lilies, *Nymphaea odorata,* made a natural pool for the final treat of the day — a refreshing swim in the waters made almost icy by an underwater spring.

Laura L. Barnes

With the death on April 29, 1966, of our Senior member, Mrs. Albert C. Barnes, there passed from the scene a lady who made a very significant contribution to botany and horticulture in the Philadelphia area.

In the mid 1920's Mrs. Barnes started to establish the planting of trees and shrubs on the grounds surrounding the art gallery of the Barnes Foundation in Merion, Pa., — a planting which later became known as the Barnes Arboretum.

Although only about 12 acres in extent, this Arboretum boasts one of the most comprehensive and discriminatingly selected collections of woody plants to be found in this area. Among its 2500 species and varieties are special collections of roses, peonies, lilacs and dwarf conifers.

In 1940 Mrs. Barnes organized a School of Botany, Horticulture and Landscape Architecture with faculty members drawn from colleges and universities in the metropolitan area. Tuition is free, the only requirements for admission being prompt and continuous attendance. During the more than a quarter of a century of its existence, over 800 students, including many P.B.C. members, have profited by the instruction offered and have achieved a better understanding of plants and of their culture.

In addition to having created the Arboretum in Merion, Mrs. Barnes developed the gardens and plantings at Ker Feal, the country estate in Chester County. (The rare Southern Coralroot Orchid, *Corallorhiza wisteriana,* is native there, 20 plants being seen in May, 1966).

Over the years her activities in these fields were recognized by special awards from various organizations, notably the American Forestry Association, American Horticultural Society, National Wildlife Federation, and Pennsylvania Horticultural Society. And on June 9, 1957, she was awarded the degree of Doctor of Horticultural Science by St. Joseph's College, the campus of which is a near neighbor of the Barnes Arboretum.

Thanks to the generosity of graduates of the School, a lectureship has been created, which makes it possible to invite distinguished botanists and horticulturists from this country and abroad to lecture to the Alumnae and their guests.

It is gratifying to report that the work which Mrs. Barnes initiated will be continued at both the School and Arboretum. — J. M. F., Jr.

Dr. Thomas S. Githens

One of our oldest members, Dr. Thomas S. Githens, passed away on April 10, 1966, at the age of 87. Receiving the M.D. degree from the University of Pennsylvania in 1899, he engaged in research at the Rockefeller Institute, and was then for many years with the H. K. Mulford Co. and its successor, Merck-Sharp & Dohme. He joined the Club in 1945 and was a faithful attendant at our meetings for nearly 20 years. While professionally interested in drug- and poisonous plants, he was best known to us from his hobby, the study of mosses, which he collected extensively in various parts of the United States. After retirement, he served as a volunteer Curator of Bryophytes at the Academy of Natural Sciences, ordering up the collections of these plants which had accumulated over many years. He published "Additional mosses of central and eastern Pennsylvania" in The Bryologist, vol. 60, p. 20-23, 1957. At the same time, vascular plants did not escape his attention, and he contributed a considerable number of specimens from both New Jersey and Pennsylvania to the herbaria of the Academy and the University of Pennsylvania. — E. T. W.

Af 73

No. 37 1967

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

CONTENTS

A Check-List of the Flora of Delaware County, Pennsylvania .... EDGAR T. WHERRY 1

The Philadelphia Botanical Club, 1967 21

MISSOURI BOTANICAL
FEB 10 1969
GARDEN LIBRARY

PUBLISHED BY THE CLUB
ACADEMY OF NATURAL SCIENCES, 19TH & PARKWAY
PHILADELPHIA, PENNSYLVANIA 19103
Subscription Price, $2.00. Back Numbers, $2.00 each
ISSUED NOVEMBER 20, 1968

to Dr. Smith, the dates of earliest collection are given in parentheses. Following the systematic list there is a Supplement accounting for the omission of a number of names used in earlier lists, by citing cases of obscure synonymy, or of taxa so far out of normal range as to seem misidentified.

PTERIDOPHYTES

LYCOPODIACEAE: *Lycopodium appressum, chapmanii* (1864), *clavatum, flabelliforme, lucidulum, obscurum.*

SELAGINELLACEAE: *Selaginella apoda, rupestris* (1937).

ISOETACEAE: *Isoetes engelmannii, riparia.*

EQUISETACEAE: *Equisetum arvense, fluviatile* (1882), *hyemale,* × *litorale* (0) (1906), *sylvaticum.*

OPHIOGLOSSACEAE: *Botrychium dissectum, matricariifolium* (1906), *obliquum, virginianum. Ophioglossum vulgatum* (v. *pseudopodum*).

OSMUNDACEAE: *Osmunda cinnamonea, claytoniana, regalis* (*v. spectabilis*).

MARSILEACEAE: *Marsilea* [*quadrifolia*] (1894).

POLYPODIACEAE: *Adiantum pedatum. Asplenium pinnatifidum* (1895), *platyneuron, trichomanes. Athyrium angustum, asplenioides, pycnocarpon* (1906), *thelypterioides. Camptosorus rhizophyllus. Cheilanthes lanosa. Cystopteris fragilis* (v. *mackayi*) (1882), *protrusa* (1891). *Dennstaedtia punctilobula. Dryopteris* × *boottii, carthusiana* (*spinulosa*), *celsa* (1952), *clintoniana* (1902), *cristata, goldiana* (1880), *intermedia, marginalis,* × *triploidea* (1908); also minor hybrids. *"Gymnocarpium" dryopteris* (1886). *Lorinseria areolata. Onoclea sensibilis. Phegopteris* [*connectilis*] (1967), *hexagonoptera. Polypodium virginianum. Polystichum acrostichoides. Pteridium aquilinum* (v. *latiusculum*).*Thelypteris noveboracensis, palustris* (v. *pubescens*). *Woodsia obtusa. Woodwardia* (*Anchistea*) *virginica.*

SPERMATOPHYTES

CONIFERS

PINACEAE: *Juniperus communis, virginiana. Pinus* [*echinata*] (1906), *rigida,* [*strobus*], *virginiana. Tsuga canadensis.*

REDUCED MONOCOTS

TYPHACEAE: *Typha angustifolia* (1882), *latifolia.*

SPARGANIACEAE: *Sparganium americanum, eurycarpum.*

NAIADACEAE: *Naias gracillima. Potamogeton amplifolius* (1897), *berchtoldii*

(1908), [*crispus*], *diversifolius* (1881), *epihydrus* (v. *nuttallii*) (1865), *foliosus, illinoensis* (0), *nodosus, perfoliatus* (v. *bupleuroides*) (0). *Zannichellia palustris* (0) (1906).

Alismataceae: *Alisma subcordatum. Sagittaria australis* (1888), *eatonii, latifolia*, typ., f. *gracilis* (1901) & v. *pubescens* (1908), *rigida* (1900), *subulata.*

Hydrocharitaceae: *Elodea* [*densa*] (1917), *nuttallii. Vallisneria americana* (0).

GRASSES

Gramineae: *Aegilops* [*cylindrica*] (1942). *Agropyron* [*repens*]. *Agrostis alba, hiemalis* (1901), *palustris* (1920), *perennans, scabra,* [*tenuis*]. *Alopecurus aequalis* (1871), [*myosuroides*] (1866). *Andropogon elliottii* (1908), *gerardii, glomeratus, scoparius, virginicus. Anthoxanthum* [*odoratum*]. *Aristida dichotoma, longespica, oligantha* (1899), *purpurascens. Arrhenatherum* [*elatius*] (1906). *Avena* [*fatua*] (1920). *Brachyelytrum erectum. Bromus* [*commutatus*], [*inermis*] (1959), [*japonicus*] (1948), [*kalmii*] (1906), *pubescens* (*purgans*) (1898), *purgans* (*latiglumis*), [*secalinus*], [*tectorum*] (1908). *Calamagrostis canadensis, cinnoides. Cenchrus pauciflorus* (*longispinus*). *Cinna arundinacea. Cynodon* [*dactylon*] (1900). *Cynosurus* [*cristatus*] (1911). *Dactylis* [*glomerata*]. *Dactyloctenium* [*aegypticum*]. *Danthonia compressa* (1907), *spicata. Deschampsia caespitosa. Digitaria* [*filiformis*], [*ischaemum*], [*sanguinalis*]. *Distichlis* [*spicata*] (1943). *Echinochloa* [*crusgalli*], *pungens* (GM), (1900), *walteri* f. *laevigata* (1947). *Eleusine* [*indica*]. *Elymus riparius, villosus, virginicus. Eragrostis capillaris,* [*cilianensis*], *hypnoides* (1952), [*multicaulis* (*peregrina*)] (1899), [*pectinacea*] (1906), [*pilosa*], [*poaeoides*] (1906), *spectabilis. Festuca* [*capillata*] (1911), [*myuros*] (1964), *obtusa, octoflora* v. *tenella,* [*ovina*] (1900), [*pratensis* (*elatior*)], [*rubra*] (1935). *Glyceria melicaria* (0), *obtusa* (1865), *pallida, septentrionalis, striata. Heleochloa* [*schoenoides*]. *Holcus* [*lanatus*]. *Hordeum* [*jubatum*] (1898), [*vulgare*] (1939). *Hystrix patula. Leersia oryzoides, virginica. Lolium* [*multiflorum*] (1908), [*perenne*], [*temulentum*] (1882). *Microstegium* (*Eulalia*) [*vimineum*] (1958). *Miscanthus* [*sinensis*] (1913). *Muhlenbergia curtisetosa* (1938), *frondosa, mexicana* (1899), *schreberi, sobolifera, sylvatica, tenuiflora. Oryzopsis racemosa* (1884). *Panicum agrostoides, anceps, annulum* (1899), *ashei* (1900), *barbulatum* (1865), *boscii,* typ. (1896) & v. *molle, capillare,* typ. & v. *occidentale* (1891), *clandestinum, columbianum* (1946), *commutatum* (1902), *depauperatum, dichotomiflorum, dichotomum, flexile* (1902), *gattingeri* (1900), *huachucae* (*implicatum*) (1899), *latifolium, lindheimeri* (1901), *linearifolium* (1901), *longifolium* (1902), *lucidum* (1916), *meridionale* (1925), *microcarpon, philadelphicum* (1878), *polyanthes* (1864), *scoparium, scribnerianum* (1864), *sphaerocarpon* (1899), *stipitatum* (1878), *verrucosum, virgatum, yadkinense* (1899). *Paspalum circulare* (*laeve* v. *c.*) (1900), *laeve, pubescens* (*ciliatifolium* v. *muhlenbergii*) (1899), [*pubiflorum* v. *glabrum*] (1935), *setaceum* (0), *supinum* (1965). *Phalaris arundinacea,* typ. & [f. *picta*] (1924), [*canariensis*] (1904). *Phleum* [*pratense*]. *Phragmites communis. Poa* [*annua*], [*compressa*], *cuspidata, palustris* (1875), [*pratensis*], *sylvestris* (1889), [*trivialis*]. *Pseudosasa* [*japonica*] (1940). *Secale* [*cereale*] (1937). *Setaria* [*faberi*] (1935), *geniculata* (1900), [*italica*] (1894), [*lutescens*], [*verticillata*] (1873), [*viridis*]. *Sorghastrum nutans. Sorghum* [*halepense*] (1932), [*vulgare*] (1925). *Spartina pectinata* (1941). *Sphenopholis intermedia, nitida* (1874), *obtusata* (v. *pubescens*). *Sporobolus vaginiflorus. Stipa avenacea. Tridens flavus,* typ. & f. *cuprea. Triplasis purpurea* (0). *Tripsacum dactyloides* (1906). *Trisetum pensylvanicum. Triticum* [*aestivum*] (1927). *Uniola laxa. Zea* [*mays*] (1945). *Zizania aquatica.*

SEDGES

CYPERACEAE: *Bulbostylis capillaris. Carex abdita* (1907), *abscondita* (1868), *aggregata* (1909), *albolutescens* (1900), *amphibola* v. *rigida, angustior, annectens,* typ. (1868), & v. *xanthocarpa* (1901), *artitecta, barrattii* (1898), *bicknellii* (1890), *blanda* (1867), *brevior* (1935), *bullata* (1902), *bushii* (1906), *caroliniana, cephalophora, communis* (1867), *conoidea, convoluta* (1868), *crinita, debilis, digitalis,* [*distenta*] (1901), *emmonsii, emoryi* (1897), *festucacea, folliculata, glaucodea, gracilescens* (1889), *gracillima, granularis* (1902), *grayi,* typ. & v. *hispidula* (1936), *gynandra* (1889), *hirsutella,* [*hirta*] (1943), *hirtifolia, hystericina* (1906), *incomperta* (1900), *interior* (1906), *intumescens, lacustris, laevivaginata* (1888), *lanuginosa, laxiculmis, laxiflora, leptalea* (1875), *longii* (1902), *lupulina, lurida, meadii* (1866), *molesta* (1903), *muhlenbergii* (1903), *normalis* (1891), *oligocarpa* (0), *pensylvanica, plana* (1903), *platyphylla* (1897), *polymorpha* (1946), *prasina, projecta* (1903), *retroflexa, rosea, scabrata* (1870), *scoparia, sparganioides,* [*spicata*] (1927), *squarrosa, stipata, straminea, striatula* (1900), *stricta, strictior* (1898), *styloflexa, swanii* (1868), *tenera* (1906), *tonsa* (1937), *torta, tribuloides, trichocarpa, vesicaria, vestita, virescens, vulpinoidea, walteriana* v. *brevis* (0). *Cyperus acuminatus* (1933), *erythrorhizos, esculentus, filicinus* (0) (1906), *filiculmis, flavescens* (1864), *inflexus* (*aristatus*) (1901), *lancastriensis* (1903), *odoratus* (*ferax*) (1908), *ovularis, refractus* (1906), *rivularis* (1864), [*rotundus*] (0) (1906), *stirgosus, tenuifolius* ("*Kyllinga*") (1965).

Dulichium arundinaceum. Eleocharis acicularis, calva (1906), *engelmannii, obtusa, tenuis, tricostata. Eriophorum gracile, virginicum. Fimbristylis autumnalis, baldwiniana, castanea* (1866). *Rhynchospora alba, capitellata, globularis* (1865). *Scirpus americanus, atrovirens* (1864), *cyperinus* (1888), *expansus* (1906), *fluviatilis, georgianus* (1899), *hattorianus* (1900), *maritimus* v. *fernaldii* (1907), *pendulus* (*"lineatus" GM*) (1888), *polyphyllus, purshianus* (1864), *rubricosus, smithii* (1866), *validus, verecundus. Scleria muhlenbergii* (*setacea*), *pauciflora, triglomerata.*

ADVANCED MONOCOTS

ARACEAE: *Acorus* [*calamus*]. *Arisaema dracontium, pusillum* (*triphyllum* GM) (1906), *triphyllum* (*atrorubens* GM). *Orontium aquaticum. Peltandra virginica. Symplocarpus foetidus.*

LEMNACEAE: *Lemna minor. Spirodela polyrrhiza. Wolffia columbiana* (1906).

XYRIDACEAE: *Xyris difformis* (*"flexuosa"* GM) (1866), *torta* (*"caroliniana"* GM).

ERIOCAULACEAE: *Eriocaulon parkeri.*

COMMELINACEAE: *Commelina* [*communis,* typ. & v. *ludens*] (1942). *Tradescantia* [*ohiensis*] (0) (1966), *virginiana.*

PONTEDERIACEAE: *Heteranthera reniformis. Pontederia cordata.*

JUNCACEAE: *Juncus acuminatus, biflorus* (1865), *bufonius, canadensis, dichotomus, dudleyi* (1912), *effusus, gerardii* (0) (1906), *longii* (1906), *marginatus, militaris* (1866), *platyphyllus, scirpoides, secundus, subcaudatus* (1908), *tenuis* (1864). *Luzula bulbosa* (1925), *echinata, multiflora* (1869).

LILIACEAE: *Aletris farinosa. Allium canadense,* [*cepa*] (1948), *tricoccum,* [*vineale*]. *Asparagus* [*officinalis*]. *Chamaelirium luteum. Convallaria* [*majalis*] (1888). *Erythronium americanum. Hemerocallis* [*fulva*]. *Hosta* [*ventricosa*] (1895). *Lilium canadense, philadelphicum, superbum. Maianthemum canadense. Medeola virginiana. Melanthium hybridum* (1903), *virginicum. Muscari* [*botryoides*], [*racemosum*] (1909). *Ornithogalum* [*umbellatum*]. *Polygonatum biflorum, canaliculatum, pubescens* (1913). *Scilla* [*sibirica*] (1959). *Smilacina racemosa. Smilax glauca* (v. *leurophylla*), *herbacea, pseudo-china* (*tamnifolia*), *pulverulenta* (1888), *rotundifolia, tamnoides* v. *hispida. Trillium cernuum. Uvularia perfoliata, sessilifolia. Veratrum viride.*

AMARYLLIDACEAE: *Hypoxis hirsuta. Leucojum* [*aestivum*] (1897). *Narcissus* [*pseudo-narcissus*] (1908).

Dioscoreaceae: *Dioscorea* [*batatas*] (1910), *villosa.*

Iridaceae: *Belamcanda* [*chinensis*]. *Iris* [*germanica*] (1909), *prismatica,* [*pseudacorus*] (1949), *versicolor. Sisyrinchium angustifolium* (*graminoides*) (1889), *intermedium* (1906), *mucronatum.*

Cannaceae: *Canna* [*generalis*] (1900).

Orchidaceae: *Aplectrum hyemale. Calopogon pulchellus. Corallorhiza maculata, odontorhiza, wisteriana. Cypripedium acaule, calceolus* v. *pubescens. Goodyera pubescens. Habenaria ciliaris, clavellata, fimbriata, flava, lacera, peramoena* (0) (1906), *psycodes. Isotria verticillata. Liparis liliifolia, loeselii. Malaxis unifolia. Orchis spectabilis. Pogonia ophioglossoides. Spiranthes cernua, gracilis, tuberosa, vernalis. Tipularia discolor. Triphora trianthophora.*

FREE-PETAL DICOTS

Saururaceae: *Saururus cernuus.*

Salicaceae: *Populus* [*alba*], [*balsamifera*] (1951), × *gileadensis* (1865), *grandidentata,* [*nigra* v. *italica*], *tremuloides. Salix* [*alba*], [*babylonica*], [*caprea*] (1896), *discolor* (1908), [*fragilis*], *humilis, interior* (1935), *nigra,* [*pentandra*] (1939), [*purpurea*], *rigida, sericea, tristis.*

Myricaceae: *Comptonia peregrina. Myrica pensylvanica* (1906).

Juglandaceae: *Carya cordiformis, glabra, laciniosa, ovalis, ovata, tomentosa. Juglans cinerea, nigra.*

Betulaceae: *Alnus* [*glutinosa*] (1890), *serrulata. Betula* [*alba*] (1921), *lenta* (1906), *nigra, populifolia* (1892). *Carpinus caroliniana* (v. *virginiana*). *Corylus americana, cornuta* (1957). *Ostrya virginiana.*

Fagaceae: *Castanea dentata. Fagus grandifolia. Quercus alba, bicolor* (1903), *coccinea, falcata,* × *heterophylla* (1909), *ilicifolia,* [*imbricaria*] (1957), *marilandica, montana* (*prinus* GM), *palustris, phellos, prinoides, rubra,* × *rudkinii* (1915), *stellata, velutina.*

Ulmaceae: *Celtis canina* (1957), *crassifolia* (1906), *georgiana* (1925), *occidentalis, tenuifolia* (1902). *Ulmus americana, rubra.*

Cannabinaceae: *Cannabis* [*sativa*] (1903). *Humulus* [*japonicus*] (1935), [*lupulus*].

Moraceae: *Broussonetia* [*papyrifera*] (1896). *Maclura* [*pomifera*] (1875). *Morus* [*alba*], *rubra.*

Urticaceae: *Boehmeria cylindrica. Laportea canadensis. Parietaria pensylvanica* (1942). *Pilea pumila. Urtica* [*dioica*], [*procera*] (1872).

Loranthaceae: *Phoradendron serotinum* (*flavescens*).

SANTALACEAE: *Comandra umbellata.*

ARISTOLOCHIACEAE: *Aristolochia* [*clematitis*] (1897), *serpentaria. Asarum canadense,* typ., v. *acuminatum* (1947), & v. *reflexum* (1901).

POLYGONACEAE: *Fagopyrum* [*sagittatum*] (1900). *Polygonum arifolium* (v. *pubescens*), [*aviculare,* typ. & v. *vegetum*] (1900), [*caespitosum* v. *longisetum*] (1935), *coccineum,* [*convolvulus,* typ. & v. *subalatum*] (1881), *cristatum* (1953), [*cuspidatum*] (1906), *erectum* (1924), [*hydropiper*], *hydropiperoides, lapathifolium* (1888), [*orientale*], *pensylvanicum,* typ. (1888) & v. *laevigatum,* [*persicaria*], *punctatum* (1891), *sagittatum, scandens, tenue. Rumex* [*acetosella*], [*crispus*], [*maritimus*] (0), *mexicanus* (1945), [*obtusifolius*], [*patientia*] (1898). *Tovara virginiana.*

CHENOPODIACEAE: *Chenopodium* [*album,* typ. & v. *lanceolatum*] (1934), [*ambrosioides*], [*botrys*] (1923), [*bushianum* (*paganum,* GM)] (1888), [*glaucum*] (1900), *missouriense* (1947), *standleyanum,* (*boscianum,* GM) (1899), [*urbicum*] (1863). *Kochia* [*scoparia* v. *culta*] (1916).

AMARANTHACEAE: *Acnida cannabina, tamariscina* (1932). *Amaranthus* [*albus*], [*hybridus*], [*palmeri*] (1941), [*powellii*] (1942), [*retroflexus*] (1950), [*spinosus*], [*torreyi*] (1941). *Celosia* [*argentea*] (1941). *Froelichia* [*gracilis*] (1942).

NYCTAGINACEAE: *Mirabilis* [*jalapa*] (1943), *nyctaginea* (1935).

PHYTOLACCACEAE: *Phytolacca americana.*

AIZOACEAE: *Mollugo* [*verticillata*].

PORTULACACEAE: *Claytonia virginica. Portulaca* [*oleracea*]. *Talinum teretifolium* (0).

CARYOPHYLLACEAE: *Agrostemma* [*githago*]. *Arenaria* [*serpyllifolia*], *stricta* (1875). *Cerastium arvense,* typ. & v. *villosum,* [*glomeratum* (*viscosum*)], [*holostioides* (*vulgatum*)], *nutans. Dianthus* [*armeria*]. *Holosteum* [*umbellatum*] (1906). *Lychnis* [*alba*] (1945), [*coronaria*] (1876). *Myosoton* [*aquaticum*] (1931). *Paronychia canadensis, fastigiata* (1888). *Sagina* [*japonica*] (1947), [*procumbens*] (1909). *Saponaria* [*officinalis*], [*vaccaria*] (1906). *Scleranthus* [*annuus*]. *Silene antirrhina,* [*armeria*] (1953), [*cucubalus*] (1906), [*dichotoma*] (1906), [*noctiflora*] (1900), *stellata. Stellaria alsine,* [*graminea*] (1906), *longifolia,* [*media*], *pubera.*

NYMPHAEACEAE: *Brasenia schreberi. Nelumbo lutea* (1900). *Nuphar advena.*

CERATOPHYLLACEAE: *Ceratophyllum demersum.*

RANUNCULACEAE: *Anemone quinquefolia, virginiana. Anemonella thalictroides. Aquilegia canadensis,* [*vulgaris*] (1942). *Caltha palustris. Cimicifuga racemosa,* typ. & f. *dissecta* (0). *Clematis* [*dioscoreifolia*] (1949), *virginiana*. *Delphinium* [*ajacis*]. *Eranthis* [*hyemalis*]. *Helleborus* [*viridis*] (1886). *Hepatica americana*. *Hydrastis canadensis*. *Ranunculus abortivus*, [*acris*], *ambigens*, [*bulbosus*], [*ficaria*] (1882), *hispidus*, typ. (1906), & v. *falsus*, *longirostris*, *pensylvanicus* (0), *recurvatus*, [*repens*] (1900), [*sceleratus*], *septentrionalis*. *Thalictrum dioicum*, *polygamum*, *revolutum* (1888).

BERBERIDACEAE: *Berberis* [*thunbergii*] (1925), [*vulgaris*] (1904). *Caulophyllum thalictroides*. *Podophyllum peltatum*.

MENISPERMACEAE: *Menispermum canadense*.

MAGNOLIACEAE: *Liriodendron tulipifera*. *Magnolia* [*acuminata*] (1957), [*tripetala*] (1947), *virginiana*.

CALYCANTHACEAE: *Calycanthus* [*floridus*, typ.] (1942) & [v. *laevigatus*] (1908).

ANNONACEAE: *Asimina triloba*.

LAURACEAE: *Lindera benzoin*. *Sassafras albidum*, typ. & v. *molle*.

PAPAVERACEAE: *Argemone* [*mexicana*] (0). *Chelidonium* [*majus*]. *Macleaya* [*cordata*] (1943). *Papaver* [*dubium*], [*rhoeas*], [*somniferum*] (0). *Sanguinaria canadensis*.

FUMARIACEAE: *Corydalis flavula* (1906). *Dicentra cucullaria*. *Fumaria* [*officinalis*].

CRUCIFERAE: *Alliaria* [*officinalis*] (1927). *Alyssum* [*alyssoides*] (0) (1906). *Arabidopsis* [*thaliana*]. *Arabis canadensis*, *glabra* (1906), *laevigata*, *lyrata*, *patens* (0) (1906). *Armoracia* [*lapathifolia*]. *Barbarea* [*verna*] (1901), [*vulgaris*, typ. & v. *arcuata*]. *Berteroa* [*incana*] (1913). *Brassica* [*alba*] (0), [*campestris*] (1903), [*juncea*] (1929), [*kaber* v. *pinnatifida*] (1901), [*nigra*]. *Camelina* [*microcarpa*]. *Capsella* [*bursa-pastoris*]. *Cardamine bulbosa*, [*hirsuta*] (1907), *parviflora* v. *arenicola* (1896), *pensylvanica*, [*pratensis*], (0) (1906). *Conringia* [*orientalis*] (1909). *Dentaria heterophylla* (1922), *laciniata*. *Descurainia* [*pinnata*]. *Diplotaxis* [*tenuifolia*] (1935). *Erophila* (*Draba*) [*verna*]. *Hesperis* [*matronalis*] (1895). *Lepidium* [*campestre*], [*densiflorum*] (1936), *virginicum*. *Lunaria* [*annua*] (0) (1906). *Nasturtium* [*officinale*], × *sterilis* (1907). *Raphanus* [*raphanistrum*], [*sativus*] (1900). *Rorippa islandica* v. *fernaldiana*, v. *hispida* (1890), [*sylvestris*] (1903). *Sisymbrium* [*altissimum*] (1901), [*officinale* v. *leiocarpum*]. *Thlaspi* [*arvense*] (1906).

CAPPARIDACEAE: *Cleome* [*spinosa*] (1907). *Polanisia* [*dodecandra* (*graveolens*)] (1939).

RESEDACEAE: *Reseda* [*lutea*] (1906), [*luteola*] (1935).

SARRACENIACEAE: *Sarracenia purpurea* (0).

DROSERACEAE: *Drosera intermedia* (1906), *rotundifolia.*

PODOSTEMACEAE: *Podostemon ceratophyllum.*

CRASSULACEAE: *Penthorum sedoides. Sedum* [*album*] (1942), [*telephium*] (1902), *ternatum.*

SAXIFRAGACEAE: *Chrysosplenium americanum. Deutzia* [*scabra*] (1946). *Heuchera americana. Hydrangea* [*paniculata*] (1943). *Mitella diphylla. Philadelphus* [*coronarius*] (1926). *Ribes americanum* (*floridum*), [*grossularia*] (1910), *hirtellum* (1917), [*nigrum*], [*odoratum*] (1901), [*sativum* (*rubrum*)]. *Saxifraga pensylvanica, virginiensis. Tiarella cordifolia.*

HAMAMELIDACEAE: *Hamamelis virginiana. Liquidambar styraciflua.*

PLATANACEAE: *Platanus occidentalis.*

ROSACEAE: *Agrimonia gryposepala, parviflora, pubescens* (1877), *rostellata* (1902), *striata* (1948). *Amelanchier arborea* (*"canadensis"*), *canadensis* (*"oblongifolia"*) (1904), *laevis* (1901), *stolonifera* (1911). *Chaenomeles* [*japonica*] (1960), [*lagenaria*] (1911). *Crataegus biltmoreana,* (1903), *calpodendron* (1908), *canbyi* (1899), × *chadsfordiana* (1903), *crus-galli, holmesiana* (1899), *intricata* (1901), *macrosperma* (1882), [*monogyna*], × *pausiaca* (1921), *pennsylvanica* (1903), [*phaenopyrum*], *pruinosa* typ. (1890), v. *dissona* (1914) & v. *latisepala* (*"cestrica"*) (1903), *punctata, stolonifera* (1903), *succulenta* typ. & v. *neofluvialis* (1903), *uniflora. Cydonia* [*oblonga*] (0). *Duchesnea* [*indica*] (1900). *Filipendula rubra* (1909). *Fragaria* [*grandiflora*], *virginiana. Geum aleppicum* v. *strictum* (1878), *canadense, laciniatum* (1867), *vernum* (1898). *Gillenia trifoliata. Physocarpus opulifolius. Potentilla* [*argentea*] (1906), *arguta* (1904), *canadensis, norvegica,* [*recta*] (1912), [*reptans*] (1932), *simplex* (1884). *Prunus americana,* [*avium*], [*cerasifera*] (1945), [*cerasus*], [*domestica*] (1899), [*padus*] (1909), [*persica*], *serotina,* [*spinosa*] (0), *virginiana* (0). *Pyrus arbutifolia* typ. & v. *atropurpurea* (*floribunda*) (1899), [*communis*], *coronaria,* [*malus*], *melanocarpa* (1893). *Rhodotypus* [*scandens*] (1954). *Rosa* [*blanda*] (0) (1906), [*canina*] (1895), *carolina,* [*eglanteria*], [*multiflora*] (1957), *palustris. Rubus allegheniensis* (1888), *argutus* (1902), *baileyanus* (1888), *cuneifolius, flagellaris, frondosus* (1903), *hispidus,* [*laciniatus*] (1932), *occidentalis, odoratus* (1914), *pensilvanicus,* [*phoenicolasius*] (1924), *plicatifolius* (1889), [*procerus*] (1867), *roribaccus* (1902), *semisetosus* (1902). *Sanguisorba canadensis. Sorbaria* [*sorbifolia*] (1907). *Spiraea* [*japonica*] (1903), *latifolia, tomentosa.*

LEGUMINOSAE: *Aeschynomene virginica* (1865). *Amorpha* [*fruticosa*] (1939). *Amphicarpa bracteata, comosa* (1884). *Apios americana. Baptisia tinctoria. Cas-*

sia fasciculata, hebecarpa, nictitans, [*tora*] (1894). *Cercis canadensis. Crotalaria sagittalis. Cytisus* [*scoparius*] (1889). *Desmodium canadense* (1906). *canescens, ciliare, cuspidatum, dillenii* (*perplexum,* GM), *glabellum* (1910), *glutinosum, laevigatum, marilandicum, nudiflorum, nuttallii, paniculatum, rigidum, rotundifolium. Gleditsia triacanthos. Glycine* [*max*] (1949). *Gymnocladus* [*dioica*] (1906). *Lathyrus* [*latifolius*] (1901), *palustris* v. *myrtifolius,* [*venosus*]. *Lespedeza capitata,* [*cuneata*] (1948), *hirta, intermedia* (1888), *nuttallii* (1905), *procumbens, repens,* [*striata*] (1903), *violacea, virginica. Lupinus perennis* (0). *Medicago* [*lupulina*], [*sativa*], [*tribuloides*] (0). *Melilotus* [*alba*], [*officinalis*]. *Phaseolus polystachios. Pisum* [*sativum*] (1952). *Robinia* [*pseudoacacia*], [*viscosa*]. *Sesbania* [*exaltata*] (1894). *Strophostyles helvola, umbellata. Stylosanthes biflora. Tephrosia virginiana. Trifolium* [*agrarium*], [*arvense*], [*dubium*] (1900), [*hybridum*] (1900), [*incarnatum*] (1903), [*pratense*], [*procumbens*], [*repens*]. *Vicia* [*angustifolia*] (1899), *cracca,* [*hirsuta*] (1890), [*sativa*] (0) (1906), [*tetrasperma*], [*villosa*] (1906). *Wisteria* [*frutescens*] (1900).

GERANIACEAE: *Erodium* [*cicutarium*]. *Geranium carolinianum, columbinum* (1881), *maculatum,* [*robertianum*] (1949), [*sanguineum*] (1926), [*sibiricum*] (1911).

OXALIDACEAE: *Oxalis* [*corniculata*] (1957), *europaea, filipes* (1884), *stricta* (1913), *violacea.*

LINACEAE: *Linum medium* (v. *texanum*) (1891), *striatum, sulcatum* (1906), [*usitatissimum*] (1904), *virginianum.*

ZYGOPHYLLACEAE: *Kallstroemia* [*intermedia*] (1932).

RUTACEAE: *Ptelea trifoliata* (1875). *Zanthoxylum americanum* (0) (1906).

SIMAROUBACEAE: *Ailanthus* [*altissima*].

POLYGALACEAE: *Polygala cruciata, nuttallii* (1865), *sanguinea, senega, verticillata* typ., v. *ambigua* & v. *isocycla* (1866).

EUPHORBIACEAE: *Acalypha gracilens* (0), *rhomboidea, virginica* (1891). *Crotonopsis elliptica* (1892). *Euphorbia corollata,* [*cyparissias*] (1939), *dentata* (1931), [*lathyris*] (1906), *maculata,* [*marginata*] (1947), [*peplus*] (1881), [*serpens*] (1932), *supina. Mercurialis* [*annua*] (1902).

CALLITRICHACEAE: *Callitriche deflexa* (v. *austinii*) (1908), *heterophylla* (1900), *palustris,* [*stagnalis*] (1932).

LIMNANTHACEAE: *Floerkea proserpinacoides.*

ANACARDIACEAE: *Rhus copallina* typ. (1952) & v. *latifolia, glabra, radicans, typhina, vernix.*

AQUIFOLIACEAE: *Ilex opaca, verticillata.*

Celastraceae: *Celastrus* [*orbiculatus*] (1939), *scandens*. *Euonymus* [*alatus*] (1938), *americanus, atropurpureus,* [*europaeus*] (1910).

Staphyleaceae: *Staphylea trifolia.*

Aceraceae: *Acer* [*campestre*] (1942), *negundo,* [*palmatum*] (1950), [*platanoides*] (1893), [*pseudo-platanus*] (1918), *rubrum* typ. & v. *trilobum* (1900), *saccharinum* (1901), *saccharum.*

Sapindaceae: *Aesculus* [*glabra*] (1907), [*octandra*] (1926).

Balsaminaceae: *Impatiens biflora* (*capensis,* GM), *pallida.*

Rhamnaceae: *Ceanothus americanus. Rhamnus* [*cathartica*].

Vitaceae: *Parthenocissus quinquefolia. Vitis aestivalis* typ. & v. *argentifolia* (1914), *labrusca, riparia* (1901), *vulpina.*

Tiliaceae: *Tilia americana.*

Malvaceae: *Abutilon* [*theophrasti*]. *Althaea* [*officinalis*] (1868), [*rosea*] (1926). *Hibiscus moscheutos,* [*syriacus*] (0) (1906), [*trionum*]. *Malva* [*moschata*] (1878), [*neglecta*]. *Sida spinosa.*

Guttiferae: *Ascyrum hypericoides. Hypericum canadense, ellipticum, gentianoides, mutilum,* [*perforatum*], *punctatum, spathulatum* (1888), *virginicum.*

Elatinaceae: *Elatine americana.*

Cistaceae: *Helianthemum bicknellii* (1878), *canadense, propinquum* (1907). *Lechea leggettii, minor, villosa* (1879).

Violaceae:*Hybanthus concolor. Viola affinis,* [*arvensis*] (1900), *blanda, conspersa, cucullata* (1901), × *emarginata* (1899), *fimbriatula, hirsutula* (1867), *incognita* (1875), *lanceolata,* [*odorata*] (1865), *pallens* (*macloskeyi* v.) (1882), *palmata, pedata* (uniform color), *pensylvanica* (1888), [*priceana*] (1956), *primulifolia, pubescens, rafinesquii* (1909), *rostrata* (1865), *rotundifolia, sagittata, sororia* (incl. "*papilionacea*"), "*stoneana*" (1892), *striata,* [*tricolor*] (1906), *triloba* typ. (1866) & v. *dilatata* (1906).

Thymelaeaceae: *Dirca palustris* (0) (1906).

Elaeagnaceae: *Elaeagnus* [*umbellata*] (1905).

Lythraceae: *Cuphea petiolata. Decodon verticillatus* (0). *Lythrum alatum* (1900), [*salicaria*] (1889). *Rotala ramosior.*

Melastomaceae: *Rhexia virginica.*

Onagraceae: *Circaea lutetiana* v. *canadensis. Epilobium angustifolium, coloratum, glandulosum* v. *adenocaulon* (1891), *leptophyllum. Gaura biennis. Jussiaea* [*michauxiana*] (1950), [*repens* v. *glabrescens*] (1934). *Ludwigia alternifolia, palustris* (v. *americana*). *Oenothera biennis, fruticosa* typ. & v. *linearis* (0) (1906), *laciniata* (1905), *perennis, pilosella* (1905), *tetragona* typ. & vars.

ARALIACEAE: *Acanthopanax* [*sieboldianum*] (1949). *Aralia nudicaulis, racemosa. Panax quinquefolius, trifolius.*

UMBELLIFERAE: *Aegopodium* [*podagraria*] (1882). *Aethusa* [*cynapium*]. *Anethum* [*graveolens*] (1943). *Angelica atropurpurea, venenosa. Chaerophyllum procumbens* (1901). *Cicuta maculata. Conium* [*maculatum*] (1870). *Cryptotaenia canadensis. Daucus* [*carota*]. *Eryngium aquaticum. Foeniculum* [*vulgare*]. *Heracleum maximum. Hydrocotyle americana, ranunculoides* (1907), [*sibthorpioidies* (*rotundifolia*, GM)] (1909), *umbellata* (0). *Osmorhiza claytonii, longistylis* (chiefly v. *villicaulis*). *Oxypolis rigidior. Pastinaca* [*sativa*]. *Pimpinella* [*saxifraga*] (0) (1906). *Ptilimnium capillaceum* (0) (1906). *Sanicula canadensis, gregaria* (1889), *marilandica. Sium suave* (1900). *Taenidia integerrima* (0) (1906). *Thaspium barbinode, trifoliatum. Zizia aptera* (1888), *aurea* (0) (1906).

CORNACEAE: *Cornus alternifolia, amomum, florida, racemosa,* [*rugosa*] (1906), [*stolonifera*] (1906).

NYSSACEAE: *Nyssa sylvatica.*

UNITED-PETAL DICOTS

ERICACEAE: *Chimaphila maculata, umbellata* (v. *cisatlantica*). *Clethra alnifolia. Epigaea repens. Gaultheria procumbens. Gaylussacia baccata, frondosa. Kalmia angustifolia, latifolia. Leucothoe racemosa. Lyonia ligustrina, mariana. Monotropa hypopitys* typ. & v. *rubra* (1927), *uniflora. Pyrola elliptica, rotundifolia* v. *americana, secunda, virens* (0) (1906). *Rhododendron nudiflorum* typ., v. *glandiferum* (1900) & pilose f. (1909), *viscosum* typ. & v. *glaucum* (1900). *Vaccinium angustifolium, atrococcum* (1866), *caesariense* (1881), *corymbosum* typ. & v. *glabrum* (1900), *lamarckii* (1934), *macrocarpon, stamineum* typ., v. *caesium* (1896), v. *interius* (1952), & v. *neglectum* (1922), *vacillans.*

PRIMULACEAE: *Anagallis arvensis* typ. & v. *coerulea* (0) (1906). *Lysimachia ciliata,* [*clethroides*] (1922), [*nummularia*] (1884), × *producta* (1907), *quadrifolia, terrestris,* [*vulgaris*] (1900). *Trientalis borealis.*

EBENACEAE: *Diospyros virginiana.*

OLEACEAE: *Chionanthus virginica* (1909). *Fraxinus americana* typ. & v. *biltmoreana* (1939), [*excelsior*] (1914), *nigra, pennsylvanica* typ., v. *austinii* (1914) & v. *subintegerrima* (1891). *Ligustrum* [*obtusifolium*] (1952), [*vulgare*]. *Syringa* [*vulgaris*] (0) (1906).

LOGANIACEAE: *Buddleia* [*davidii*] (1942).

GENTIANACEAE: *Bartonia paniculata* (1902), *virginica. Gentiana andrewsii,* *catesbaei* (1888), *clausa* (1901), *crinita, saponaria, villosa. Obolaria virginica. Sabatia angularis.*

APOCYNACEAE: *Amsonia* [*tabernaemontana*] (1863). *Apocynum androsaemifolium, cannabinum* typ., v. *glaberrimum* (1908), & v. *pubescens* (1902), × *medium* (1865), *sibiricum* (1906). *Vinca minor* (1895).

ASCLEPIADACEAE: *Asclepias amplexicaulis, exaltata, incarnata* typ. (1902) & v. *pulchra, purpurascens, quadrifolia, rubra, syriaca, tuberosa, variegata, verticillata,* (*Acerates*) *viridiflora* typ. & v. *lanceolata* (1958). *Cynanchum* [*nigrum*] (1906). *Matelea* (*Gonolobus*) *obliqua* (0).

CONVOLVULACEAE: *Calystegia* [*hederacea* (*wallichiana*)] (1945), *sepium, spithamaea. Convolvulus* [*arvensis*]. *Cuscuta compacta* (1863), *coryli* (1910), *gronovii, polygonorum* (1903). *Ipomoea* [*coccinea*] (1874), [*hederacea*], *lacunosa* (1946), *pandurata, purpurea,* [*tricolor*] (1942).

POLEMONIACEAE: *Phlox* [*divaricata* v. *laphamii*] (1908), *maculata,* [*paniculata*] (1906), *pilosa, subulata. Polemonium reptans* typ. & pilose f.

HYDROPHYLLACEAE: *Hydrophyllum canadense, virginianum.*

BORAGINACEAE: *Cynoglossum* [*officinale*], *virginianum. Echium* [*vulgare*]. *Hackelia virginiana. Lithospermum* [*arvense*]. *Mertensia virginica. Myosotis arvensis* (0), *laxa,* [*scorpioides*] (1906), *verna, versicolor* (1865). *Onosmodium virginianum. Symphytum* [*officinale*].

VERBENACEAE: *Verbena* [*bracteosa*] (1932), *hastata,* [*officinalis*] (1933), *simplex* (1865), *urticifolia* typ. & v. *leiocarpa* (1902).

LABIATAE: *Agastache nepetoides, scrophulariaefolia. Blephilia ciliata* (1875). *Collinsonia canadensis. Cunila origanoides. Galeopsis* × [*tetrahit* v. *bifida*]. *Glechoma* [*hederacea*]. *Hedeoma pulegioides. Lamium* [*amplexicaule*], [*maculatum*] (1893), [*purpureum.*] *Leonurus* [*cardiaca*], [*marrubiastrum*]. *Lycopus americanus,* [*europaeus*] (1934), *rubellus* (1945), × *sherardii* (1960), *uniflorus* (1900), *virginicus. Melissa* [*officinalis*]. *Mentha arvensis* typ. & v. *villosa* (1896), [*longifolia*] (1882), [*piperita*], [*spicata*]. *Monarda clinopodia* (1889), *didyma* (1875), *fistulosa* typ. & v. *mollis, punctata* (1928). *Nepeta* [*cataria*]. *Ocimum* [*basilicum*] (1948). *Origanum* [*vulgare*]. *Perilla* [*frutescens*] (1925). *Physostegia virginiana* (1867). *Prunella* [*laciniata*] (1912), *vulgaris* [typ.] (1879) & v. *lanceolata. Pycnanthemum incanum, muticum, tenuifolium, torrei, virginianum. Salvia lyrata,* [*sylvestris*] (1899). *Satureja vulgaris* (v. *neogaea*). *Scutellaria elliptica, epilobiifolia, integrifolia, lateriflora, nervosa, parvula* (v. *leonardii*), *serrata. Stachys palustris, tenuifolia* v. *platyphylla. Teucrium canadense* (v. *virginicum*). *Thymus* [*serpyllum*]. *Trichostema dichotomum.*

SOLANACEAE: *Datura* [*stramonium*], [*tatula*] (0) (1906). *Lycium* [*halimifolium*] (1901). *Lycopersicon* [*esculentum*] (1913). *Nicandra* [*physalodes*] (0) (1906). *Petunia* [*axillaris*] (1900), [*hybrida*] (1948), [*violacea*] (1864). *Physalis* [*alkakengii*] (1943), *heterophylla* typ. & v. *ambigua, subglabrata. Solanum americanum* (*nigrum*), *carolinense*, [*dulcamara*], [*rostratum*] (1923).

SCROPHULARIACEAE: *Agalinis* (*Gerardia*) *purpurea, tenuifolia. Aureolaria flava, pedicularia, virginica. Buchnera americana. Castilleia coccinea. Chelone glabra. Conobea multifida* (1932). *Cymbalaria* [*muralis*] (1908). *Gratiola neglecta. Kicksia* [*elatine*] (1871). *Limosella subulata. Linaria canadensis*, [*vulgaris*]. *Lindernia anagallidea* (1866), *dubia. Mazus* [*japonicus*] (1948), [*reptans*] (1949). *Melampyrum lineare* typ. & v. *pectinatum* (1900). *Micranthemum micranthemoides* (0). *Mimulus alatus, ringens. Pedicularis canadensis, lanceolata. Penstemon digitalis, hirsutus*, [*pallidus*] (1878). *Scrophularia lanceolata* (1891), *marilandica. Verbascum* [*blattaria*], [*lychnitis*], [*thapsus*]. *Veronica americana*, [*arvensis*], [*filiformis*] (1946), [*hederaefolia*], [*longifolia*] (1942), *officinalis, peregrina*, [*persica*] (1878), [*polita*] (1906), [*serpyllifolia*]. *Veronicastrum virginicum.*

BIGNONIACEAE: *Campsis radicans* (1912). *Catalpa* [*bignonioides*]. *Paulownia* [*tomentosa*] (1888).

OROBANCHACEAE: *Conopholis americana* (0). *Epifagus virginiana. Orobanche* [*minor*] (1903), *uniflora.*

LENTIBULARIACEAE: *Utricularia gibba* (0) (1906), *vulgaris.*

PHRYMACEAE: *Phryma leptostachya.*

PLANTAGINACEAE: *Plantago aristata* (1891), [*indica*] (1933), [*lanceolata*], [*major*] (1900), *rugelii, virginica.*

RUBIACEAE: *Cephalanthus occidentalis. Diodia teres. Galium aparine, asprellum, boreale* (1906), *circaezans, concinnum* (1945), *lanceolatum*, [*mollugo*] (1913), *obtusum* (1902), *pilosum, tinctorium*, [*tricorne*] (1915), *triflorum*, [*verum*] (1946). *Hedyotis* (*Houstonia*) *caerulea. Mitchella repens. Sherardia* [*arvensis*] (1892).

CAPRIFOLIACEAE: *Diervilla lonicera. Lonicera dioica* (1896), [*japonica*] (1890), [*morrowi*] (1946), *sempervirens. Sambucus canadensis. Symphoricarpos albus* (v. *laevigatus*) (1908), *orbiculatus* (1888). *Triosteum aurantiacum. Viburnum acerifolium, dentatum, lentago, nudum* (0), *prunifolium, recognitum.*

VALERIANACEAE: *Valerianella intermedia*, [*olitoria*].

DIPSACACEAE: *Dipsacus* [*fullonum*] (1942), [*sylvestris*]. *Knautia* [*arvensis*] (1943).

Cucurbitaceae: *Cucumis* [*melo*] (“*Muskmelon*”) (1942). *Echinocystis lobata* (1900). *Sicyos angulatus.*

Campanulaceae: *Campanula americana* (0), *aparinoides,* [*rapunculoides*] (1879). *Platycodon* [*grandiflorum*] (1945). *Triodanis* (*Specularia*) *perfoliata.*

Lobeliaceae: *Lobelia cardinalis, inflata, nuttallii, puberula, siphilitica, spicata.*

COMPOSITES

Compositae: *Achillea* [*millefolium* typ. & f. *rosea*] (1889). *Actinomeris alternifolia. Ambrosia artemisiifolia, trifida. Anaphalis margaritacea. Antennaria fallax* (1882), *neglecta* (1897), *neodioica* (1899), *parlinii* (1912), *plantaginifolia. Anthemis* [*arvensis*] (1881), [*cotula*], [*tinctoria*] (1909). *Arctium* [*minus*], [*nemorosum*] (1888). *Artemisia* [*absinthium*] (0) (1909), [*annua*], [*stelleriana*] (1896), [*vulgaris*] (1939). *Aster acuminatus* (1890), *cordifolius, depauperatus* (1908), *divaricatus, infirmus, laevis, lateriflorus, linariifolius, lowrieanus* (1889), *macrophyllus* (1905), *novae-angliae, novi-belgii, patens* typ. & v. *phlogifolius* (1901), *pilosus* typ. (1935) v. *demotus, prenanthoides* (1891), *puniceus, radula, sagittifolius, schreberi* (1884), *simplex, spectabilis* (0), [*tataricus*] (1945), *umbellatus, undulatus, vimineus* (1891), *virginiensis* (1888). *Baccharis halimifolia. Bellis* [*perennis*] (1937). *Bidens aristosa* (1878), *bidentoides, bipinnata, cernua, comosa* (1899), *connata* v. *petiolata, coronata, discoidea, frondosa, laevis,* [*polylepis*] (1906), *vulgata* (1899). *Cacalia atriplicifolia. Carduus* [*nutans*] (0) (1906). *Centaurea* [*calcitrapa*] (1870), [*cyanus*], [*jacea*] (1906), [*maculosa*] (1935), [*nigra*] (1959), [*solstitialis*] (1906). *Chrysanthemum* [*leucanthemum* v. *pinnatifidum*], [*parthenium*]. *Chrysopsis* (*Heterotheca*) *mariana. Cichorium* [*intybus*]. *Cirsium altissimum,* [*arvense* typ. & v. *vestitum*] (1935), *discolor, horridulum, muticum* (1888), *pumilum, virginianum* v. *filipendulum, vulgare. Coreopsis* [*lanceolata*] (1922), [*tinctoria*] (1909), *tripteris* (1908). *Cosmos* [*bipinnatus*] (1942), [*sulphureus*] (1949). *Crepis* [*capillaris*] (1936). *Eclipta alba. Elephantopus carolinianus. Erechtites hieracifolia. Erigeron annuus,* (*Conyza*) *canadensis, philadelphicus, pulchellus, strigosus. Eupatorium aromaticum, coelestinum, dubium, fistulosum, hyssopifolium* (1906), *perfoliatum, pilosum, pubescens* (1881), *purpureum* (1896), *rotundifolium, rugosum* typ. & v. *tomentellum* (1923), *serotinum* (1892), *sessilifolium. Filago* (*Gifola*) [*germanica*]. *Galinsoga* [*ciliata*], [*parviflora*] (1942). *Gnaphalium obtusifolium, purpureum, uliginosum. Grindelia* [*squarrosa*] (1944). *Guizotia* [*abyssinica*] (1941). *Helenium autumnale, nudiflorum* (1901). *Helianthus* [*annuus*] (1902), *decapetalus, divaricatus, giganteus,* [*grosseserratus*] (1906), [*laetiflorus*] (1943), [*mollis*] (1900), *strumosus,* *tuberosus. Heliopsis helianthoides. Hieracium* [*aurantiacum*] (1947), [*flagellare*] (1943), *gronovii, marianum* (0), (1906), [*murorum*] (1924), *paniculatum,* [*pratense*] (1925), *scabrum, venosum. Hypochoeris* [*radicata*] (1913). *Inula* [*helenium*]. *Krigia biflora, virginica. Kuhnia eupatorioides. Lactuca biennis, canadensis* typ., v. *latifolia* (1899) v. *longifolia* & v. *obovata* (1900), *floridana* typ. & v. *villosa* (1888), [*scariola* typ.] (1906) & [v. *integrata*] (1900), (*Ixeris*) [*stolonifera*] (1957). *Liatris spicata. Matricaria* [*matricarioides*] (1939). *Mikania scandens. Onopordum* [*acanthium*] (1864). *Parthenium* [*hysterophorus*] (1875). *Petasites* [*vulgaris*] (1870). *Picris* [*hieracioides*] (1906). *Polymnia canadensis* (0), *uvedalia. Prenanthes alba, altissima, serpentaria* typ. & v. *simplicifolia* (1866), *trifoliolata* (1899). *Rudbeckia hirta* typ. (1903) & v. *pulcherrima, laciniata, triloba. Senecio aureus* v. *gracilis* & v. *intercursus* (1900), *pauperculus* (1899), *smallii* (1868), [*vulgaris*] (1875). *Sericocarpus asteroides, linifolius. Silphium* [*perfoliatum*] (1883). *Solidago altissima, bicolor, caesia, canadensis* (v. *hargeri*), *flexicaulis, gigantea* typ. & v. *leiophylla* (1878), *graminifolia* (v. *nuttallii*) (as a *Euthamia*), *juncea, nemoralis, odora, patula, puberula* (1869), *rigida* (0), *rugosa* typ. (1863), v. *aspera* (1908) & v. *villosa* (1958), *sempervirens, speciosa, squarrosa, tenuifolia, uliginosa* (1860), *ulmifolia. Sonchus* [*arvensis*] (1924), [*asper*], [*oleraceus*], [*uliginosus*] (1925). *Tanacetum* [*vulgare*]. *Taraxacum* [*officinale*]. *Tragopogon* [*major*] (1947), [*porrifolius*] (1901), [*pratensis*] (1889). *Tussilago* [*farfara*]. *Vernonia glauca* (1904), *noveboracensis. Xanthium chinense* (1902), *italicum* (1900), *oviforme* (1932), *pensylvanicum* (1899), [*spinosum*] (0).

SUPPLEMENT

(Miscellaneous synonyms, misidentifications, etc.)

PTERIDOPHYTES

Lycopodium "alopecuroides" (1906) = *chapmanii; "annotinum"* = *chapmani,* sterile; *"inundatum"* = *appressum. Isoetes "lacustris"* = *riparia,* submerged state. *Botrychium "lunarioides"* = both *dissectum* & *obliquum. "Asplenium filix-femina"* = both *Athyrium angustum* & *asplenioides. Cystopteris "bulbifera"* (1882) = *fragilis* v. *mackayi. "Aspidium spinulosum"* = both *Dryopteris carthusiana* and *intermedia. "Woodsia ilvensis"* (1906) = *Cheilanthes lanosa.*

REDUCED MONOCOTS

Sparganium "androcladum" (1906) & *"simplex"* = *americanum. Naias "flexilis"* = *gracillima. Potamogeton "heterophyllus"* = *epihydrus* v. *nuttallii;*

"lonchites" (1906) & *"natans"* = *nodosus; "lucens"* (0) = *illinoensis; "pauciflorus"* = *foliosus; "spirillus"* = *diversifolius. Sagittaria "engelmanniana"* (1906) = *latifolia* f. *gracilis; "graminea"* = *eatonii; "pusilla"* = *subulata; "variabilis"* = *latifolia. Elodea "canadensis"* = *nuttallii.*

GRASSES

(In this family the taxonomy and nomenclature follow most closely Hitchcock & Chase, Manual Grasses U.S., ed. 2, 1950).

"Aira" = *Deschampsia. Alopecurus "geniculatus"* (1906) = *aequalis. Bromus "ciliatus"* = *purgans* (*latiglumis*)*; "racemosus"* = *commutatus. Cenchrus "tribuloides"* = *pauciflorus* (*longispinus*). *Elymus "canadensis"* = *riparius. Glyceria "elongata"* & *"torreyana"* (0) (1906) = *melicaria. Muhlenbergia "mexicana"* (before 1906) = *frondosa. Panicum "latifolium"* = *boscii* v. *molle; "macrocarpon"* = *latifolium; "nitidum"* (1906) = *lindheimeri; "porterianum"* (1906) = *boscii. "Poa flava"* = *Tridens flavus. Sphenopholis "pensylvanica"* = *intermedia. "Tricuspis purpurea"* = *Triplasis purpurea. "Tricuspis seslerioides"* = *Tridens flavus.*

SEDGES

Carex "albursina" (1906) out of range, error; *"amphibola"* (1906) out of range, error; *"asa-grayi"* (1960) = *grayi; "collinsii"* (1906), out of range, error; *"costellata"* (1906) = *virescens; "cristatella"* (1906) = *molesta; "filiformis"* = *lanuginosa; "flava"* out of range, error; *"goodenovii"* (1906) = *emoryi; "kozingii"* (1906) = *grayi; "lagopodioides"* = *tribuloides; "littoralis"* (1906) = *barrattii; "lupuliformis"* (1906) out of range, error; *"miliacea"* = *prasina; "monile"* = *vesicaria; "novae-angliae"* out of range, error; *"pubescens"* = *hirtifolia; "retrocurva"* = *laxiculmis; "riparia"* = *lacustris; "smithii"* = *caroliniana; "stellulata"* = *angustior; "sterilis"* (1906) = *angustior; "tentaculata"* = *lurida; "tenuis"* = *debilis. Scirpus georgianus* is now deemed an independent species; *S. hattorianus* has recently been recognized in U.S.; the Delaware Co. taxon heretofore called *S. "lineatus"* is now known as *S. pendulus.*

ADVANCED MONOCOTS

Xyris: In this genus the revision by Kral (1966) is followed: *X. "arenicola"* (0) (1906), out of range, error. *Eriocaulon "septangulare"* = *parkeri. Commelina "virginica"* = *communis. Heteranthera*: specimens labelled *"Schollera graminea,"* which would belong here, are misidentified *Potamogeton foliosus.*

Juncus "tenuis" (before 1906) = *platyphyllus. Smilax "bona-nox"* (0) (1906), out of range, error. *Corallorhiza trifida* (0), out of range, error. *Habenaria*: A plant listed by Smith as *"Gymnadenia flava"* (0), now known as *Habenaria integra,* extends this far north only in the heart of the New Jersey Pine-barrens, so must have been misidentified. *Spiranthes "praecox"* (0) (1906) = *vernalis.*

FREE-PETAL DICOTS, SALICACEAE TO SAXIFRAGACEAE

Populus "graeca", not identified; *"heterophylla"* (0) (1906), out of range, error. *Salix "bebbiana"* (0) (1906), out of range, error; *"petiolaris"* (0), out of range, error; *"viminalis"* = [*purpurea*]. *Castanea pumila* (0) (1906), cultivated material; *Quercus macrocarpa* (0) (1906), cultivated material; *Q. prinus* (*michauxii* GM), cultivated material. *Polygonum "amphibium"* & *"emersum"* (1906) = *coccineum; "dumetorum"* = *scandens. Rumex "hastatulus"* (0) (1906), out of range, error; *"persicarioides,"* (1906) = [*maritimus*]; *"verticillatus"* (0) (1906), out of range, error. *Chenopodium "album"* comprises both the vernal *C.* [*album*] and aestival *C. missouriense. Amaranthus "graecizans"* (1906) = [*albus*].

Cerastium arvense, vars. uncertain. *Paronychia "argyrocoma"* (0) (1906), out of range, error. *Delphinium "consolida"* = [*ajacis*]. *Ranunculus "aquatilis"* & *"Batrachium trichophyllum"* (0) (1906) = *R. longirostris; "fascicularis"* = *hispidus* v. *falsus; "flammula"* & *"obtusiusculus"* = *ambigens; "repens"* = *septentrionalis. Camelina "sativa"* = [*microcarpa*]. *Cardamine "hirsuta"* = *pensylvanica; "rotundifolia,* American Water Cress" = *Nasturtium* [*officinale*]. *Nasturtium "palustre,* Marsh cress" = *Rorippa islandica* v. *fernaldiana. Ribes "oxyacanthoides"* (1906) = *hirtellum.*

FREE-PETAL DICOTS—ROSACEAE

Agrimonia "eupatoria" & *"hirsuta"* (1906) = *gryposepala. Amelanchier "botryapium"* (1906) = *canadensis; "canadensis"* = *arborea. Crataegus*: (Many names based on Delaware County collections are not now accepted as species). *C. "abjecta"* = *biltmoreana; "apposita"* = *intricata; "arcana"* = *pruinosa; "arcuata"* = *holmesiana; "cestrica"* (type loc. Preston Run barrens) = *pruinosa* v. *latisepala; chadsfordiana* (type loc. Chads Ford) is now deemed a hybrid; *"coccinea"* of Smith = *succulenta; "cordata"* of Smith = [*phaenopyrum*]; *"darlingtoniana"* = *intricata; "definita"* (type loc. Preston Run barrens) = *intricata; "edurescens"* (type loc. Castle Rock vic.) = *pruinosa; "flava"* of Smith = *uniflora; "immitis"*, not traced; *"inducta"* = *intricata; "insolita"* (type loc. Collen

Brook) = *macrosperma; "laetula"* (type loc. Preston Run barrens) = *intricata; "oxyacantha"* = [*monogyna*]; *"painteriana"* (type loc. Preston Run barrens) = *intricata; "radiosa"* (type loc. Collen Brook) = *succulenta* v. *neofluvialis; "saxatilis"* (type loc. Preston Run barrens) = *intricata; "smithii"* (type loc. Lownes Run) = *uniflora; "tatnalliana"* = *pennsylvanica; "tenella"* (type loc. Castle Rock) = *macrosperma; "uplandia"* (type loc. Upper Darby) = *pruinosa* v. *latisepala.*

Fragaria "vesca" = [*grandiflora*]. *Prunus "chicasa"* = *angustifolia,* cultivated material. *Rosa "carolina"* = *palustris; "lucida"* = *carolina. Rubus "canadensis" & procumbens"* (1906) = *flagellaris; "nigrobaccus"* (1906) & *"villosus"* = *allegheniensis, "randii"* (1906) = *semisetosus.*

LEGUNINOSAE TO CORNACEAE

Cassia "marylandica" = *hebecarpa. Lespedeza "violacea"* comprises *L. intermedia, violacea, & virginica. Medicago "denticulata"* (0) (1906), out of range, error. *Oxalis "cymosa"* (1906) & *"stricta"* = *europaea. Linum "boottii"* = *striatum. Euphorbia "hypericifolia"* & *"nutans"* (1906) = *maculata* (GM). *Callitriche "bifida"* (1906) = *heterophylla; "verna"* = *palustris. Vitis "cordifolia"* = *vulpina. Malva "rotundifolia"* = [*neglecta*]; *"sylvestris"* (1906), cultivated material. *Hypericum "adpressum"* (0) out of range, error; *"corymbosum"* & *"maculatum"* (1906) = *punctatum; "gymnanthum"* (0) (1906) out of range, error. *Lechea "major"* = *leggettii. Viola "blanda"* comprises *blanda* & *pallens* (*macloskeyi*); *"cucullata"* comprises *affinis, cucullata, rostrata, & sororia; "lecontiana"* (1906) = *affinis; "muhlenbergii"* = *conspersa; "palmata"* comprises *palmata & triloba; "pubescens"* comprises *pensylvanica & pubescens; "villosa"* (1906) = *hirsutula. Passiflora "incarnata"* (0) (1906), cultivated material. *Epilobium "lineare"* (1906), *"palustre,"* & *"strictum"* (1906) = *leptophyllum. Oenothera "fruticosa"* comprises *fruticosa & tetragona. Aralia "spinosa"* cultivated material, may be [*chinensis*]. *"Thaspium trifoliatum* v. *aureum"* (1906) = *Zizia aurea.*

UNITED-PETAL DICOTS, NON-COMPOSITE

Lysimachia "stricta" = *terrestris. Fraxinus "pubescens"* = *pennsylvanica; "sambucifolia"* = *nigra. Trachelospermum difforme* (1906), cultivated material. *"Cynoglossum morisoni"* = *Hackelia virginiana. Myosotis "palustris"* (Smith) = *laxa;* (1906) = *"scorpioides." Lycopus "sessiliflorus"* (1906) = *uniflorus; "sinuatus"* = *americanus. Marrubium vulgare,* cultivated material. *Pycnanthe-*

mum "clinopodioides" (0), out of range, error; *"lanceolatum"* comprises both *torrei* & *virginianum; "pilosum"* (0), out of range, error. *Scutellaria "canescens"* (0), out of range, error. *Physalis "pubescens"* (0), out of range, error; *"philadelphica" = subglabrata; "virginiana"* (0), out of range, error; *"viscosa" = ambigua. "Gerardia paupercula"* (0), out of range, error. *Gratiola "virginiana" = neglecta. "Ilysanthes gratioloides" = Lindernia dubia. Limosella "aquatica"* & *"tenuifolia"* (1906) = *subulata. Penstemon "penstemon"* (0), (1906), out of range, error. *Veronica "agrestis"* (1906) = *polita; "byzantina"* (1906) = *persica. Plantago "major"* (Smith) = *rugelii. Galium "trifidum" = tinctorium. "Houstonia longifolia"* (0) (1906), out of range, error. *Lonicera "canadensis"* (0) (1906), out of range, error. *Triosteum "perfoliatum" = aurantiacum. Viburnum "dentatum"* comprises both *dentatum* and *recognitum* (GM); *"venosum"* (1906) = *dentatum* (GM). *Valerianella "radiata" = intermedia.*

COMPOSITAE

Arctium "major" = minus. Artemisia "caudata" (0) (1906), out of range, error. *Aster "concinnus"* (1906) = *laevis; "corymbosus" = divaricatus; "cornifolius,"* (as a *Diplopappus*) = *infirmus; "ericoides"* (prior to 1906) = *pilosus* v. *demotus; "humilis,"* (as a *Doellingeria*) (0) (1906), not identified; *"longifolius" = novi-belgii; "miser" = lateriflorus; "multiflorus"* (0) (1906), out of range, error; *"praealtus"* (0) (1906), out of range, error; *"salicifolius"* (1906) = *simplex; "tenuifolius"* (0) (1906), out of range, error; *"tradescanti"* (1906) = *vimineus. Bidens "chrysanthemoides" = laevis; "involucrata"* (1906) = *polylepis. "Coreopsis bidentoides" = Bidens bidentoides; "trichosperma" = Bidens coronata. Erigeron "bellidifolius" = pulchellus. Eupatorium "maculatum"* (0), out of range, error; *"purpureum"* (prior to 1906) = *fistulosum; "tenuifolium" = pilosum; "trifoliatum" = dubium. Galinsoga "parviflora"* (prior to 1906) = *ciliata. Helianthus "tracheliifolius" = strumosus. Hieracium "marianum"* (0) (1906), out of range, error. *Lactuca "acuminata,"* (as a *Mulgedium*) = *floridana* v. *villosa; "elongata" = canadensis* v. *longifolia; "leucophaea" = biennis; "sagittaefolia"* (1906) = *canadensis* typ. *Prenanthes "fraseri" = serpentaria. Rudbeckia "fulgida"* (0) out of range, error; *"hirta"* = [*hirta* v. *pulcherrima* (*serotina*)]. *Senecio "obovatus"* (0) (1906) = *pauperculus. Solidago "arguta"* (0) (1906) out of range, error; *"caroliniana"* (as a *Euthamia*) = *tenuifolia; "hispida"* (0) (1906) out of range, error; *"lanceolata" = graminifolia* v. *nuttallii; "muhlenbergii" = juncea; "neglecta"* (1906) = *uliginosa. Xanthium "canadense"* (1906), *"glabratum"* (1906), & *"strumarium" = chinense; "commune"* (1906) = *italicum.*

Dr. Smith's 1862 list contained 950 species and infra-specific taxa, and the present one has 1725, an increase of 80 per cent. While there are some doubtful cases, the respective numbers of introduced taxa included are close to 175 and 350. It is interesting that such a large number had already made themselves at home here as early as 1862; the following ten seem especially noteworthy:

Hemerocallis fulva, Arabidopsis ("Sisymbrium") thaliana, Prunus avium, Vicia tetrasperma, Rhamnus cathartica, Convolvulus arvensis, Galeopsis tetrahit, Catalpa bignonioides, Galinsoga ciliata ("parviflora"), Tussilago farfara.

Also of interest are the earliest dates of appearance of the aggressive invaders of today in sufficient quantity to lead to their being collected; these ten, unknown to Dr. Smith, are by now ubiquitous if not calamitous:

Setaria faberi (1935), *Polygonum caespitosum* v. *longisetum* (1935), *Berberis thunbergii* (1925), *Duchesnea indica* (1899), *Rosa multiflora* (1957), *Rubus phoenicolasius* (1924), *Trifolium hybridum* (1900), *Lysimachia nummularia* (1884), *Lonicera japonica* (1890), *Hieracium pratense* (1925).

May this check-list serve as a stimulus to continuing field work in Delaware County! When collectors come upon taxa not included, specimens should be preserved and filed in one of the major herbaria. Hopefully corrections and additions will accumulate, and form the basis of future Bartonia articles.

The Philadelphia Botanical Club, 1967

Dr. Edgar T. Wherry, *Honorary President*

Dr. Walter M. Benner, *President*
Dr. Ralph M. Sargent, *Vice President*
Mrs. Robert Robertson, *Secretary*
Mr. William L. Freyburger, *Treasurer*
Mr. Bayard Long, *Curator Emeritus*
Dr. Edgar T. Wherry, *Editor*

ACTIVE MEMBERS (as of December 31, 1967)

	Elected
Mrs. C. J. Allen, Jr., Woodside Lane, Riverton, N.J. 08077	1957
Mrs. F. E. Atkins, 3422 Queen Lane, Philadelphia, Pa. 19129	1953
Dr. Walter M. Benner, 5636 Loretta Ave., Philadelphia, Pa. 19124	1912
Dr. David Berkheimer, Limekiln, Berks Co., Pa. 19535	1943
Mrs. Roscoe Bowers, Braddocks Mill Lake, Marlton, N.J. 08053	1963
Miss E. Marie Boyle, 1521 Norman Rd., Havertown, Pa. 19083	1965
Mrs. Robert A. Bradel, 900 Overton Ave., Morrisville, Pa. 19067	1963
William B. Brientnall, 238 Wood St., Burlington, N.J. 08016	1964
William C. Brumbach, 850-D Berkshire Drive, Reading, Pa. 19601	1943
Jew-ming Chao, Dept. of Biology, University of Pennsylvania, Philadelphia, Pa. 19104	1967

Richard B. Chillas, 233 Winona Ave., Philadelphia, Pa. 19144	1942
Miss Carola S. Collings, 1728 Pine St., Philadelphia, Pa. 19103	1954
Mrs. Alan Crawford, White House Rd., Devon, Pa. 19333	1962
Dr. Donald W. Crittenden, 21 Temple Ave., Sellersville, Pa. 18960	1966
Miss Phoebe Crosby, 105 East Mill Rd., Flourtown, Pa. 19031	1966
W. L. Dix, Methodist Church Home, 70 Stockton Ave., Ocean Grove, N.J. 07756	1942
Albert Donaghy, Jr., R.D. 1, Pottstown, Pa. 19464	1952
Dr. Francis Drouet, Academy of Natural Sciences, Philadelphia, Pa. 19103	1961
Miss Elizabeth C. Earle, 132 Carlton Place, Media, Pa. 19063	1935
Mrs. Mark F. Emerson, Evans Rd. at Sumneytown Pike, Gwynedd Valley, Pa. 19437	1964
Mrs. Nellie A. Erisman, 218 W. Abbottsford Ave., Philadelphia, Pa. 19144	1945
Mrs. Harold Evans, Awbury, E. Washington Lane, Philadelphia, Pa. 19138	1931
Mrs. W. Brooks Evert, 115 N. Lakeside Dr. E., Birchwood Lakes, Medford, N.J. 08055	1957
Carl W. Fenninger, 8304 Stenton Ave., Philadelphia, Pa. 19118	1947
Miss Elizabeth H. Flavell, 69 S. College Ave., Flourtown, Pa. 19031	1946
Dr. John M. Fogg, Jr., 6807 Quincy St., Philadelphia, Pa. 19119	1921
Mrs. John M. Fogg, Jr., 6807 Quincy St., Philadelphia, Pa. 19119	1961
William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa. 19083	1956
Mrs. William L. Freyburger, 1036 Larchmont Ave., Havertown, Pa. 19083	1956
Miss Julia W. Frick, 275 North Latch's Lane, Merion Station, Pa. 19066	1963
Dr. Robert B. Gordon, 415 Sharpless St., West Chester, Pa. 19380	1942
Mrs. Robert B. Gordon, 415 Sharpless St., West Chester, Pa. 19380	1962
Mrs. Dorothy Graham, 1811 Addison St., Philadelphia, Pa. 19146	1964
John F. Gyer, Jessup Mill Rd., Clarksboro, N.J. 08510	1960
Louis E. Hand, Box 146, New Lisbon, N.J. 08064	1936
Dr. J. Zern Heberling, 206 Market St., Bangor, Pa. 18013	1966
Dr. Stevens Heckscher, Dept. of Mathematics, Swarthmore College, Swarthmore, Pa. 19081	1966
Miss Josephine de N. Henry, Gladwyne, Pa. 19035	1938
J. Norman Henry, Jr., 410 Mulberry Lane, Haverford, Pa. 19041	1956
R. L. Hill, Jr., 180 Drexel Ave., Lansdowne, Pa. 19050	1963
Mrs. R. L. Hill, Jr., 180 Drexel Ave., Lansdowne, Pa. 19050	1963
Frank Hochgesang, 422 Edgemoor Drive, Moorestown, N.J. 08057	1966
Mrs. Frank Hochgesang, 422 Edgemoor Drive, Moorestown, N.J. 08057	1966
Mrs. John M. Huebner, 150 Anton Rd., Wynnewood, Pa. 19096	1958
Donald Iffland, 153 Cricket Ave., Ardmore, Pa. 19003	1964
Mrs. Lawrence E. Jewett, Howell Rd., RD 1, Malvern, Pa., 19355	1966
Mrs. M. L. Kendig, 65 S. Main St., Manheim, Pa. 17545	1935
Miss Natalie B. Kimber, 538 E. Locust Ave., Philadelphia, Pa. 19144	1928
Dr. Lawrence J. King, Division of Natural Sciences, Dept. of Biology, State University College, Geneseo, N.Y. 14454	1963
Ludwig A. Koelnau, 850 N. 22nd St., Philadelphia, Pa. 19103	1952
Mrs. Ida K. Langman, 248 Harvey St., Philadelphia, Pa. 19144	1937
Dr. Hui-Lin Li, Morris Arboretum, Philadelphia, Pa. 19118	1944
Bayard Long, 250 Ashbourne Rd., Elkins Park, Philadelphia, Pa. 19117	1906
Mrs. Baldwin Lucké, 630 Rose Lane, Bryn Mawr, Pa. 19010	1965
Mrs. C. P. Mann, 905 Cherry Lane, Riverton, N.J. 08077	1957
Sidney Margolis, Park Drive Manor, Apt. 703 B, Lincoln Dr. & Harvey St., Philadelphia, Pa. 19144	1962
Mrs. Alfred Martin, Orchard Lane, Three Tuns, Ambler, Pa. 19002	1961
Dr. Jack McCormick, 1005 Millbrook Rd., Newtown Square, Pa. 19073	1966
James R. McGrath, 56 Whartman Rd., Graterford, Pa. 19426	1961
Mrs. Charles J. McKinney, 233 Rex Ave., Philadelphia, Pa. 19118	1961

Dr. Tilford D. Miller, 215 King Ave., Westmont, N.J. 08108	1962
Mrs. Tilford D. Miller, 215 King Ave., Westmont, N.J. 08108	1962
Miss Julia Moore, Mill Creek Rd., Chalfont, Pa. 18914	1963
Dr. Edwin T. Moul, Dept. of Botany, Rutgers University, New Brunswick, N.J. 08903	1945
A. Edward Murray, Jr., 70 Kraft Lane, Kenwood, Levittown, Pa. 19053	1960
Mrs. Edward Norman, 22 Pin Oak Drive, Trenton, N.J. 08638	1961
Mrs. George P. Orr, Willow Brook Farm, Paoli, Pa. 19301	1935
Miss Elizabeth Orsatti, 7238 N. 20th St., Philadelphia, Pa. 19138	1962
Dr. William Overlease, Mill Rd., Box 144, R.D. 1, West Chester, Pa., 19380	1964
Mrs. Frank Parker, 402 S. 45th St., Philadelphia, Pa. 19104	1950
Dr. Ruth Patrick, P.O. Box 4095, Chestnut Hill Station, Philadelphia, Pa. 19118	1937
Mrs. Marguerita Phillips, 125 West Penn St., Philadelphia, Pa. 19144	1965
Mrs. Richard Philson, 321 Blaine Ave., West Berlin, N.J. 08091	1964
Harold W. Pretz, 123 S. 17th St., Allentown, Pa. 18104	1909
Dr. Charles W. Reimer, 856 Cricket Rd., Secane, Pa. 19018	1953
Dr. Robert Robbins, Temple University, Dept. of Radiology, Philadelphia, Pa. 19140	1954
Dr. Robert Robertson, 125 W. Spruce St., Moorestown, N.J. 08057	1960
Mrs. Robert Robertson, 125 W. Spruce St., Moorestown, N.J. 08057	1960
Miss Anne Rowland, 114 Avon Rd., Haverford, Pa. 19041	1948
Mrs. Karl Rugart, 612 Bryn Mawr Ave., Penn Valley, Narberth, Pa. 19072	1942
Dr. Ralph M. Sargent, 520 Panmure Rd., Haverford, Pa. 19041	1948
Mrs. Ralph M. Sargent, 520 Panmure Rd., Haverford, Pa. 19041	1962
Dr. Robert L. Schaeffer, Jr., 30 N. 8th St., Allentown, Pa. 18101	1938
Dr. Alfred E. Schuyler, Academy of Natural Sciences, Philadelphia, Pa. 19103	1962
Miss Dorothy Scott, 2359 E. Cumberland St., Philadelphia, Pa. 19125	1959
Mrs. George R. Shaefer, 2976 Dorman Ave., Broomall, Pa. 19008	1963
Henry Singer, Valley Hill Farm, Valley Forge, Pa. 19481	1963
William Sipple, 918 Clements Bridge Rd., Runnemede, N.J. 08078	1966
Mrs. Walter Smedley, 409 Fairview Rd., Narberth, Pa. 19072	1963
Dr. Robert Speck, 737 Cedar Ave., Haddonfield, N.J. 08033	1964
James R. Steel, Jr., 1503 Shoemaker Rd., Abington, Pa. 19001	1961
Charles G. Stehle, 1714 Brook Rd., Rydal, Pa. 19046	1963
Mrs. Charles G. Stehle, 1714 Brook Rd., Rydal, Pa. 19046	1963
Dr. C. I. Stiteler, 901 E. 20th St., Chester, Pa. 19013	1945
Mrs. George Stoops, Providence Rd., Media, Pa. 19063	1960
Miss Mary Sullivan, Montgomery Court L 23, Narberth, Pa. 19072	1954
Mrs. Edmond G. Thomas, 10 Norman Lane, Philadelphia, Pa. 19118	1963
Miss Elizabeth Thorp, 403 S. 41st St., Philadelphia, Pa. 19104	1953
Mrs. J. H. Vance, 148 Montgomery Ave., Bala-Cynwyd, Pa. 19004	1950
Charles H. Van Housen, 110 N. 19th St., Philadelphia, Pa. 19103	1954
Jesse T. Vogdes, N. Lemon St., Media, Pa. 19063	1960
Mrs. Jesse T. Vogdes, N. Lemon St., Media, Pa. 19063	1958
Dr. Paul R. Wagner, 789 Main St., Collegeville, Pa. 19426	1935
E. Perot Walker, 3009 Park Rd., Lafayette Hills, Pa. 19444	1939
Mrs. E. Perot Walker, 3009 Park Rd., Lafayette Hills, Pa. 19444	1958
Albert J. Webb, 351 Oak Terrace, Wayne, Pa. 19087	1959
Dr. Lily A. Weierbach, 5220 Wayne Ave., Philadelphia, Pa. 19144	1958
Dr. Edgar T. Wherry, 41 W. Allens Lane, Philadelphia, Pa. 19119	1925
Hans Wilkens, 424 S. 15th St., Reading, Pa. 19602	1928
David L. Williams, 6 Brookside Rd., Wallingford, Pa. 19086	1963
John Wolf, 44 High St., Sharon Hill, Pa. 19079	1966
Mrs. James B. Woodford, Cedar Run Lake, Marlton, N.J. 08053	1959
Mrs. H. Winfield Wright, 515 Folcroft Ave., Folcroft, Pa. 19032	1959

CORRESPONDING MEMBERS

Dr. Theodor P. Haas, Islander Hotel, 400 Seaside Ave., Waikiki, Honolulu, Hawaii 96815	1946
Charles E. Mohr, Box 3900, Greenville, Del. 19807	1959
Mrs. E. D. Rudolph, Dept. of Botany and Plant Pathology, Ohio State University, 1735 Neil Ave., Columbus, Ohio 43210	1961
Dr. Harold St. John, Bishop Museum, Honolulu, Hawaii, 96819	1927
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Michigan 48104	1921
Dr. Heber W. Youngken, 17 Cox Rd., Winchester, Mass. 01890	1918

DECEASED

Miss Margaret Butler	March 13, 1967
Mrs. J. Norman Henry	April 16, 1967
Walter Palmer	July 15, 1967

Program Of Meetings

Date	*Subject*	*Speaker*	*Attendance*
Jan. 26	Poisonous Plants Around the Home	Dr. Ara Der Marderosian	36
Feb. 23	The Taxonomy of 18 North American Sedges	Dr. Alfred E. Schuyler	14
Mar. 23	Spring Flowers of Pennsylvania	Dr. Donald G. Huttleston	31
Apr. 27	Climbing Into Spring On The Grand Teton	Mrs. John M. Huebner	24
May 25	Two Early Philadelphia Plant Explorers: John and William Bartram. With Illustrations of William's Travels and Discoveries in the Southern Highlands	Dr. Ralph M. Sargent	50
Sept. 28	Reports by Members of Summer Activities		17
Oct. 26	Spring on the Bahamian Coast	Mrs. Robert Robertson	26
Nov. 16	The Natural Vegetation in Ohio in Pioneer Days	Dr. Robert B. Gordon	26
Dec. 21	A Geologist Becomes a Botanist	Dr. Edgar T. Wherry	39

Trips*

Date	*Locality*	*Attendance*
Mar. 5	Early Spring at the Tyler Arboretum, Lima, Pa.	9
Apr. 30	Mid-Spring in the Brandywine Valley and on the Serpentine Barrens, Pennsylvania	30
Oct. 1	Autumn at French Creek State Park, Pa.	24

*These trips have been planned and led by Dr. Ralph Sargent, with the assistance of Dr. Edgar T. Wherry, Dr. Robert B. Gordon and others.

A f 73

No. 38 1968

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

CONTENTS

A Check-List of the Flora of Philadelphia County, Pennsylvania .... EDGAR T. WHERRY 1

The Philadelphia Botanical Club, 1968 18

PUBLISHED BY THE CLUB
ACADEMY OF NATURAL SCIENCES, 19TH & PARKWAY
PHILADELPHIA, PENNSYLVANIA 19103
Subscription Price, $2.00. Back Numbers, $2.00 each.
ISSUED SEPTEMBER 30, 1969

[illegible]
NOV [illegible] 69
[illegible]

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

NO. 38 **1968**

A Check-list of the Flora of Philadelphia County, Pennsylvania

EDGAR T. WHERRY
University of Pennsylvania

While several local plant lists have been published, they have covered not only Philadelphia County but also outlying areas: *e.g.* Barton's Compendium Florae Philadelphicae of 1818 "within a circuit of ten miles around" and Keller & Brown's Handbook of the Flora of Philadelphia and Vicinity of 1905 through 23 counties of Pennsylvania, New Jersey, and Delaware. It seemed of interest to compile a list of the taxa found in Philadelphia County itself, for comparison with that of its neighbor Delaware, published in the preceding number of Bartonia.

Again the nomenclature largely follows Gray's Manual, ed. 8, 1950, with species names all decapitalized and introduced taxa enclosed in brackets. A special category of the latter is indicated by (b), in reference to their having come in primarily on ship's ballast, dumped along the Delaware River shore. Some are from the Atlantic, Gulf, or Pacific coasts of the United States, others from tropical America and various countries of the Old World. They were mostly collected during the period 1855 - 1885, and only a few have persisted to the present day, or migrated far inland.

Most of the entries were obtained from the Pennsylvania Flora catalog maintained at the University of Pennsylvania, but the herbaria there and at the Academy of Natural Sciences were also checked extensively. Reports not represented by specimens but deemed credible are indicated by (0).

PTERIDOPHYTES

LYCOPODIACEAE: *Lycopodium appressum, chapmanii, flabelliforme, lucidulum, obscurum, tristachyum.*

SELAGINELLACEAE: *Selaginella apoda, rupestris.*

ISOETACEAE: *Isoetes engelmannii, riparia* typ. & v. *robbinsii.*

EQUISETACEAE: *Equisetum arvense, fluviatile, hyemale, sylvaticum.*

OPHIOGLOSSACEAE: *Botrychium dissectum, matricariifolium, multifidum* v. *intermedium, obliquum, simplex* v. *laxifolium* & v. *tenebrosum, virginianum. Ophioglossum vulgatum* (v. *pseudopodum*).

OSMUNDACEAE: *Osmunda cinnamomea, claytoniana, regalis* (v. *spectabilis*).

POLYPODIACEAE: *Adiantum pedatum. Asplenium* × *ebenoides, pinnatifidum, platyneuron, ruta-muraria, trichomanes. Athyrium angustum, asplenioides, pycnocarpon, thelypterioides. Camptosorus rhizophyllus. Cheilanthes lanosa. Cystopteris bulbifera, fragilis* (v. *mackayi*). *Dennstaedtia punctilobula. Dryopteris* × *boottii, carthusiana* (*"spinulosa"*), *cristata, goldiana, intermedia, marginalis,* × *triploidea,* × *uliginosa;* also minor hybrids. *"Gymnocarpium" dryopteris. Lorinseria areolata. Matteuccia pensylvanica. Onoclea sensibilis. Pellaea atropurpurea, glabella. Phegopteris connectilis, hexagonoptera. Polypodium virginianum. Polystichum acrostichoides. Pteridium aquilinum* (v. *latiusculum*). *Thelypteris noveboracensis, palustris* (v. *pubescens*). *Woodsia obtusa.*

SPERMATOPHYTES

CONIFERS

PINACEAE: *Juniperus communis, virginiana. Picea mariana* (0). *Pinus echinata, rigida, strobus, virginiana. Tsuga canadensis.*

MONOCOTS, REDUCED

TYPHACEAE: *Typha angustifolia, latifolia.*

SPARGANIACEAE: *Sparganium americanum, androcladum, eurycarpum.*

NAIADACEAE: *Naias flexilis, guadalupensis. Potamogeton* [*crispus*], *diversifolius* (0), *epihydrus* v. *nuttallii* (0), *foliosus* v. *macellus, gramineus* (0), *nodosus, pectinatus* (0), *perfoliatus* v. *bupleuroides, spirillus* (0), *vaseyi. Zannichellia palustris* v. *major.*

ALISMATACEAE: *Alisma subcordatum. Sagittaria australis, latifolia* typ., f. *gracilis,* f. *obtusa,* & v. *pubescens, rigida, subulata.*

HYDROCHARITACEAE: *Elodea* [*densa*], *nuttallii. Vallisneria americana.*

GRASSES

GRAMINEAE: *Agropyron* [*pungens* (b)], [*repens*]. *Agrostis alba, hiemalis, palustris, perennans,* [*spica-venti* (b)], [*tenuis*]. *Aira* [*caryophyllaea* (b)]. *Alopecurus aequalis,* [*carolinianus* (b)], [*creticus* (b)], [*geniculatus* (b)], [*myosuroides* (b)], [*pratensis*], [*rendlei* (b)]. *Andropogon elliottii, gerardii, glomeratus,* (*Schizachyrium*) *scoparius, virginicus. Anthoxanthum* [*odoratum*]. *Aristida dichotoma, longespica* typ. & v. *geniculata, oligantha. Arrhenatherum* [*elatius*]. *Arthraxon* [*hispidus* v. *cryptatherus*]. *Avena* [*fatua*], [*sativa*]. *Beckmannia* [*syzigachne*]. *Bouteloua curtipendula. Brachyelytrum erectum. Briza* [*minor* (b)]. *Bromus* [*arenarius* (b)], [*commutatus*], [*inermis*], [*japonicus* (v. *porrectus*)], [*mollis*], *pubescens* (*purgans*), *purgans* (*latiglumis*), [*racemosus*], [*secalinus*], [*squarrosus*], [*sterilis*], [*tectorum*]. *Calamagrostis canadensis. Cenchrus longispinus,* [*tribuloides* (b)]. *Chloris* [*petraea* (b)], [*virgata*]. *Cinna arundinacea. Coix* [*lachryma*]. *Corynephorus* [*canescens* (b)]. *Cynodon* [*dactylon*]. *Cynosurus* [*cristatus*], [*echinatus*]. *Dactylis* [*glomerata*]. *Dactyloctenium* [*aegypticum* (b)]. *Danthonia compressa, spicata. Deschampsia flexuosa. Digitaria filiformis,* [*ischaemum*], [*sanguinalis*], [*serotina* (b)]. *Distichlis* [*spicata* (b)]. *Echinochloa* [*crusgalli*], *pungens, walteri* typ. & f. *laevigata. Eleusine* [*indica*]. *Elymus canadensis* typ. & f. *glaucifolius, riparius, villosus* typ. & f. *arkansanus, virginicus* typ. & f. *hirsutiglumis. Elymus* × *Hystrix. Eragrostis capillaris,* [*cilianensis*], *frankii, hypnoides,* [*multicaulis*], *pectinacea,* [*pilosa*], [*poaeoides*], *spectabilis. Erianthus giganteus* (v. *compactus*). *Festuca* [*capillata*], [*danthonii* (b)], [*megalura* (b)], (*Vulpia*) [*myuros*], *obtusa,* (*Vulpia*) *octoflora* (v. *tenella*), [*ovina*], [*pratensis* (*elatior*)], [*rubra*]. *Glyceria acutiflora, grandis, pallida, septentrionalis, striata. Haynaldia* [*villosa*]. *Heleochloa* [*alopecuroides* (b)], [*schoenoides*]. *Holcus* [*lanatus*], [*mollis* (b)]. *Hordeum* [*jubatum*], [*murinum*(b)], [*vulgare*]. *Hystrix patula* typ. & v. *bigeloviana. Koeleria* [*phleoides* (b)]. *Leersia oryzoides, virginica. Leptoloma cognatum. Lolium* [*multiflorum*], [*perenne*], [*temulentum*]. *Microstegium* (*Eulalia*) [*vimineum* (v. *variabilis*)]. *Miscanthus* [*sinensis*]. *Muhlenbergia frondosa, schreberi, sobolifera, sylvatica, tenuiflora,* [*uniflora* (b)]. *Oryzopsis racemosa. Panicum* [*acroanthum* (b)], [*adspersum* (b)], *agrostoides,* [*amarum* (b)], *anceps, ashei, barbulatum, boscii* typ. & v. *molle, capillare* typ. & v. *occidentale, clandestinum, columbianum, commonsianum* v. *addisonii, commutatum, depauperatum* typ. & v. *psilophyllum, dichotomiflorum, dichotomum, ensifolium* (0), *gattingeri, huachucae* (*implicatum*), *latifolium, lindheimeri, microcarpon,* [*miliaceum*], *phila-*

delphicum, polyanthes, scribnerianum, sphaerocarpon, stipitatum, verrucosum, villosissimum, virgatum, yadkinense. *Paspalum circulare* (*laeve* v. *c.*), [*distichum* (b)], *laeve, psammophilum, pubescens* (*ciliatifolium* v. *muhl.*), *setaceum,* [*supinum*]. *Phalaris arundinacea,* [*canariensis*], [*paradoxa*(b)]. *Phleum* [*pratense*], [*subulatum* (b)]. *Pholiurus* [*incurvus* (b)]. *Phragmites australis* (*communis*) (v. *berlandieri*). *Poa* [*annua*], *autumnalis,* [*compressa*], *cuspidata, palustris,* [*pratensis*], [*trivialis*]. *Polypogon* [*monspeliensis* (b)]. *Pseudosasa* [*japonica*]. *Puccinellia* [*distans*], [*fasciculata* (b)], [*maritima* (b)], [*rupestris* (b)]. *Secale* [*cereale*]. *Setaria* [*faberi*], *geniculata,* [*italica*], [*lutescens*], [*verticillata*], [*viridis*]. *Sitanion* (*Hordeum*) [*hystrix* (b)]. *Sorghastrum nutans.* *Sorghum* [*halepense*], [*vulgare*]. *Spartina* [*patens* (b)], *pectinata.* *Sphenopholis intermedia, nitida, obtusata.* *Sporobolus cryptandrus,* [*poiretii* (b)], *vaginiflorus.* *Stipa avenacea.* *Tragus* [*racemosus* (b)]. *Tridens flavus* typ. & f. *cuprea.* *Triplasis* [*purpurea*]. *Tripsacum dactyloides.* *Trisetum pensylvanicum.* *Triticum* [*aestivum*]. *Uniola laxa.* *Zea* [*mays*]. *Zizania aquatica.*

SEDGES

CYPERACEAE: *Bulbostylis capillaris.* *Carex abdita, abscondita,* × *aestivaliformis, aggregata, albolutescens, amphibola* v. *rigida* & v. *turgida, angustior, annectens* typ. & v. *xanthocarpa, argyrantha, artitecta, blanda, brevior, bushii, caroliniana, cephalophora, communis, comosa, conjuncta, conoidea, convoluta, crinita, davisii, debilis, digitalis,* [*distans* (b)], *emmonsii, festucacea, folliculata, glaucodea, gracilescens, gracillima, granularis* v. *haleana, gynandra, hirsutella,* [*hirta*], *hirtifolia, hystricina, impressa, intumescens, laevivaginata, lanuginosa, laxiculmis, laxiflora, leavenworthii,* [*leporina*], *leptalea, lupulina, lurida, mesochorea, mitchelliana, normalis, pensylvanica* typ. & v. *lucorum, plana, prasina, radiata, retroflexa* (0), *rosea, scabrata, scoparia, sparganioides,* [*spicata*], *squarrosa, stipata, straminea, striatula, stricta, styloflexa, swanii, tonsa, tribuloides, trisperma, umbellata, vestita, virescens, vulpinoidea.* *Cladium mariscoides.* *Cyperus albomarginatus, brevifolius, compressus, diandrus, engelmannii, erythrorhizos, esculentus* typ. & f. *angustispicatus,* [*filicinus* (b)], *filiculmis* typ. & v. *macilentus, flavescens,* [*fuscus* (b)], [*globulosus* (b)], [*grayi* (b)], *inflexus* (*aristatus*), [*iria*], *lancastriensis,* [*ochraceus* (b)], *odoratus, ovularis,* [*polystachyos* v. *texensis* (b)], *retrofractus* (0), [*retrorsus* (b)], *rivularis,* [*rotundus* (b)], *strigosus, tenuifolius* (*Kyllinga*). *Dichromena* [*colorata* (b)]. *Dulichium arundinaceum.* *Eleocharis acicularis, calva, obtusa, quadrangulata,* *smallii, tenuis* typ. & v. *pseudoptera. Eriophorum virginicum* (0). *Fimbristylis autumnalis*, [*baldwiniana* (b)], [*castanea* (b)], [*miliacea*], [*vahlii* (b)]. *Rhynchospora alba, capitellata. Scirpus americanus, atrovirens, cyperinus, fluviatilis, georgianus*, [*maritimus* (b)], [*pallidus*], *pendulus* (*lineatus* GM), *polyphyllus, purshianus, rubricosus, smithii, validus, verecundus* (*planifolius*). *Scleria pauciflora, setacea* (*muhlenbergii*).

MONOCOTS, ADVANCED

ARACEAE: *Acorus calamus. Arisaema dracontium, triphyllum* (*atrorubens*, GM). *Orontium aquaticum. Peltandra virginica. Pinellia* [*ternata*]. *Symplocarpus foetidus.*

LEMNACEAE: *Lemna minor, perpusilla, trisulca. Spirodela polyrrhiza. Wolffia columbiana.*

XYRIDACEAE: *Xyris torta* (*caroliniana* GM).

ERIOCAULACEAE: *Eriocaulon parkeri.*

COMMELINACEAE: *Commelina* [*communis* typ. & v. *ludens*], [*diffusa* (*nudiflora*)], *virginica. Tradescantia ohiensis*, [*subaspera*], *virginiana.*

PONTEDERIACEAE: *Heteranthera dubia, reniformis. Pontederia cordata.*

JUNCACEAE: *Juncus acuminatus, biflorus, bufonius, effusus* v. *costulatus* & *solutus, gerardii, longii, marginatus, nodosus, platyphyllus, secundus, tenuis* typ. & f. *discretiflorus, torreyi. Luzula echinata, multiflora.*

LILIACEAE: *Aletris farinosa. Allium canadense, cernuum*, [*oleraceum*], *tricoccum*, [*vineale*]. *Amianthium muscaetoxicum. Asparagus* [*officinalis*]. *Chamaelirium luteum. Convallaria* [*majalis*]. *Erythronium americanum. Hemerocallis* [*fulva*]. *Hosta* [*ventricosa*]. *Lilium canadense, philadelphicum, superbum. Maianthemum canadense. Medeola virginiana. Melanthium virginicum. Muscari* [*botryoides*]. *Ornithogalum* [*nutans*], [*umbellatum*]. *Polygonatum biflorum, commutatum* (*canaliculatum* GM), *pubescens. Scilla* [*nonscripta*]. *Smilacina racemosa* typ. & v. *cylindrata, stellata* (0). *Smilax glauca* v. *leurophylla, herbacea, pseudo-china* (*tamnifolia*) (0), *pulverulenta, rotundifolia, tamnoides* v. *hispida. Tricyrtis* [*hirta*]. *Trillium cernuum* typ. & v. *macranthum. Tulipa* [*sylvestris*]. *Uvularia perfoliata, sessilifolia. Veratrum viride.*

AMARYLLIDACEAE: *Hypoxis hirsuta. Narcissus* [*pseudonarcissus*].

DIOSCOREACEAE: *Dioscorea* [*batatas*], *villosa* typ. & f. *glabrifolia.*

IRIDACEAE: *Belamcanda* [*chinensis*]. *Iris* [*pseudacorus*], *versicolor. Sisyrinchium angustifolium, arenicola, mucronatum.*

ORCHIDACEAE: *Aplectrum hyemale. Calopogon pulchellus* (0), *Corallorhiza maculata, odontorhiza, wisteriana. Cypripedium acaule, calceolus* v. *pubescens. Goodyera pubescens. Habenaria ciliaris, clavellata, flava* v. *herbiola, lacera. Isotria medeoloides, verticillata. Liparis lilifolia, loeselii. Malaxis unifolia. Orchis spectabilis. Pogonia ophioglossoides. Spiranthes cernua, gracilis, vernalis. Triphora trianthophora.*

DICOTS, FREE-PETAL

SAURURACEAE: *Saururus cernuus.*

SALICACEAE: *Populus* [*alba*], [*canescens*], *deltoides,* × *gileadensis, grandidentata,* [*nigra* typ. & v. *italica*], *tremuloides. Salix* [*alba* typ. & v. *vitellina*], [*babylonica*], [*caprea*], *discolor* v. *latifolia,* [*fragilis*], *humilis, lucida* (0), *nigra* typ. & v. *falcata* (0), [*purpurea*], *rigida, sericea, tristis.*

MYRICACEAE: *Comptonia peregrina. Myrica pensylvanica.*

JUGLANDACEAE: *Carya cordiformis, glabra, ovalis, ovata* typ. & v. *pubescens, tomentosa. Juglans cinerea, nigra.*

CORYLACEAE (BETULACEAE): *Alnus* [*glutinosa*], *serrulata. Betula* [*alba*], *lenta, nigra,* [*pendula*], *populifolia. Carpinus caroliniana* (v. *virginiana*). *Corylus americana, cornuta* (0). *Ostrya virginiana.*

FAGACEAE: *Castanea dentata. Fagus grandifolia. Quercus alba, bicolor, coccinea, falcata,* × *heterophylla, ilicifolia,* [*imbricaria*], *muhlenbergii, palustris, phellos, prinoides* (0), *prinus* (*montana*), *rubra, stellata, velutina.*

ULMACEAE: *Celtis occidentalis, tenuifolia. Ulmus americana,* [*pumila*], *rubra.*

MORACEAE: *Broussonetia* [*papyrifera*]. *Maclura* [*pomifera*]. *Morus* [*alba*], *rubra.*

CANNABINACEAE: *Cannabis* [*sativa*]. *Humulus* [*japonicus*], *lupulus.*

URTICACEAE: *Boehmeria cylindrica* typ. & v. *drummondiana. Laportea canadensis. Parietaria* [*diffusa* (b)], *pensylvanica. Pilea pumila. Urtica* [*dioica*], *procera,* [*urens* (b)].

SANTALACEAE: *Comandra umbellata.*

ARISTOLOCHIACEAE: *Aristolochia* [*clematitis*], *serpentaria. Asarum canadense* typ. & v. *reflexum.*

POLYGONACEAE: *Fagopyrum* [*sagittatum*]. *Polygonum arifolium* (v. *pubescens*), [*aviculare* typ., v. *littorale* (b) & v. *vegetum*], [*caespitosum* (v. *longisetum*)], *coccineum* typ. & f. *natans,* [*convolvulus* typ. & v. *subalatum*], *cristatum,* [*cuspida-*

tum], [*dubium* (b)], *erectum*, [*hydropiper*], *hydropiperoides*, *lapathifolium* typ., [v. *prostratum*] & v. *salicifolium*, [*minus* (b)], [*orientale*], *pensylvanicum* typ. & v. *laevigatum*, [*persicaria*], *punctatum* typ. & v. *leptostachyum* (*confertiflorum*), [*sachalinense*], *sagittatum*, *scandens*, *tenue*. *Rumex* [*acetosa*], [*acetosella*], [*altissimus*], [*conglomeratus* (b)], [*crispus*], [*maritimus* (b)], [*mexicanus*], [*obtusifolius*], [*patientia*], [*pulcher*] . *Tovara virginiana*.

Chenopodiaceae: *Atriplex* [*arenaria* (b)], *patula* typ., v. *hastata* & [v. *littoralis*], [*rosea* (b)], [*tatarica* (b)]. *Beta* [*procumbens* (b)], [*vulgaris*]. *Chenopodium* [*album* typ. & v. *lanceolatum*], [*ambrosioides* typ., v. *anthelminticum*, v. *chilense*, & v. *obovatum* (b)], [*botrys*], [*bushianum* (*paganum*)], [*carinatum*], [*glaucum*], *gigantospermum* (*hybridum*), *missouriense*, [*murale*], [*opulifolium*], [*polyspermum*], [*retusum* (b)], [*rubrum* (b)], [*serotinum*], *standleyanum* (*boscianum*), [*urbicum*], [*vulvaria* (b)]. *Cycloloma* [*atriplicifolium*]. *Kochia* [*scoparia* typ. (*alata*) & v. *culta*]. *Roubieva* [*multifida* (b)]. *Salsola* [*kali* typ. & v. *tenuifolia*]. *Spinacia* [*oleracea*]. *Sueda* [*maritima* (b)], [*richii* (b)].

Amaranthaceae: *Acnida* (alternatively *Amaranthus*) *cannabina*, [*tamariscina* (b)]. *Alternanthera* [*paronychioides* (b)]. *Amaranthus* [*albus*], [*caudatus*], [*cruentus*], [*deflexus* (b)], [*graecizans*], [*hybridus*], [*lividus*], [*palmeri*], [*powellii*], [*pumilus* (b)], [*retroflexus*], [*spinosus*], [*viridis*]. *Celosia* [*argentea*]. *Froelichia* [*gracilis*]. *Gomphrena* [*globosa*].

Nyctaginaceae: *Mirabilis* [*jalapa*], *nyctaginea*.

Phytolaccaceae: *Phytolacca americana*.

Aizoaceae: *Mesembryanthemum* [*crystallinum* (b)]. *Mollugo* [*cerviana* (b)], [*verticillata*]. *Trianthema* [*portulacastrum* (b)].

Portulacaceae: *Claytonia virginica* typ. & f. *robusta*. *Portulaca* [*grandiflora*], [*oleracea*].

Caryophyllaceae: *Agrostemma* [*githago*]. *Arenaria* [*serpyllifolia*]. *Cerastium arvense*, *nutans*, [*tomentosum*], [*viscosum* (*glomeratum*)], [*vulgatum* (*holosteoides*)]. *Corrigiola* [*littoralis* (b)]. *Dianthus* [*armeria*], [*prolifer*]. *Gypsophila* [*muralis* (b)]. *Herniaria* [*glabra*], [*hirsuta* (b)]. *Lychnis* [*alba*], [*coronaria*], [*dioica* (b)], [*flos-cuculi*] (0), [*viscaria*]. *Myosoton* [*aquaticum*]. *Paronychia canadensis*, *fastigiata*. *Polycarpon* [*tetraphyllum* (b)]. *Sagina decumbens*, [*japonica*], *procumbens*. *Saponaria* [*officinalis*], [*vaccaria*]. *Scleranthus* [*annuus*]. *Silene antirrhina* typ. & f. *deaneana*, [*armeria*], [*caroliniana* v. *pensylvanica* (b)], [*cucubalus*], [*dichotoma*], [*noctiflora*], *stellata*, *virginica* (0). *Spergula* [*arvensis*]. *Spergularia* [*rubra*]. *Stellaria alsine*, [*graminea*], *longifolia*, [*media*], *pubera*.

CERATOPHYLLACEAE: *Ceratophyllum demersum.*

NYMPHAEACEAE: *Brasenia schreberi* (0). *Nelumbo lutea. Nuphar advena, microphyllum. Nymphaea odorata.*

RANUNCULACEAE: *Actaea pachypoda* (*alba*). *Anemone quinquefolia, virginiana. Anemonella thalictroides. Aquilegia canadensis. Caltha palustris. Cimicifuga racemosa. Clematis* [*dioscoreifolia*], [*ligusticifolia*], *virginiana. Delphinium* [*ajacis*], [*consolida* (b)]. *Eranthis* [*hyemalis*]. *Hepatica americana. Hydrastis canadensis. Ranunculus abortivus,* [*acris*], *ambigens,* [*arvensis* (b)], [*bulbosus*], [*ficaria* typ. & double], *hispidus* typ. & v. *falsus, longirostris, pusillus, recurvatus,* [*repens* typ. & v. *villosus*], *reptans* v. *ovalis,* [*sardous* (b)], [*sceleratus*], *septentrionalis, trichophyllus* (0). *Thalictrum dioicum, polygamum, revolutum.*

BERBERIDACEAE: *Berberis* [*thunbergii*], [*vulgaris*]. *Caulophyllum thalictroides. Podophyllum peltatum.*

LARDIZABALACEAE: *Akebia* [*quinata*].

CERCIDOPHYLLACEAE: *Cercidophyllum* [*japonicum*].

MENISPERMACEAE: *Menispermum canadense.*

MAGNOLIACEAE: *Liriodendron tulipifera. Magnolia* [*tripetala*].

ANNONACEAE: *Asimina triloba.*

LAURACEAE: *Lindera benzoin. Sassafras albidum* typ. & v. *molle.*

PAPAVERACEAE: *Argemone* [*mexicana*]. *Chelidonium* [*majus*]. *Eschscholtzia* [*californica*]. *Glaucium* [*flavum* (b)]. *Hypecoum* [*grandiflorum* (b)]. *Macleaya* [*cordata*]. *Papaver* [*argemone*], [*dubium*], [*hybridum* (b)], [*rhoeas*], [*somniferum*]. *Sanguinaria canadensis.*

FUMARIACEAE: *Adlumia fungosa* (0). *Corydalis flavula, sempervirens. Dicentra canadensis* (0), *cucullaria. Fumaria* [*officinalis*], [*parviflora* (b)].

CRUCIFERAE: *Alliaria* [*officinalis*]. *Alyssum* [*alyssoides*]. *Arabidopsis* [*thaliana*]. *Arabis canadensis,* [*glabra*], *laevigata, lyrata,* [*virginica*]. *Armoracia* [*lapathifolia* (*rusticana*)]. *Barbarea* [*verna*], [*vulgaris* typ. & v. *arcuata*]. *Berteroa* [*incana*]. *Brassica* [*campestris*], [*hirta* (*alba*)], [*juncea*], [*kaber* v. *pinnatifida*], [*nigra*], [*rapa*]. *Cakile* [*maritima* (b)]. *Camelina* [*microcarpa*], [*sativa*]. *Capsella* [*bursa-pastoris*]. *Cardamine bulbosa,* [*hirsuta*], [*impatiens*], *parviflora* v. *arenicola, pensylvanica,* [*pratensis*]. *Cardaria* [*draba*], [*pubescens*]. *Conringia* [*orientalis*]. *Coronopus* [*didymus*], [*procumbens* (b)]. *Dentaria heterophylla, laciniata. Descurainia* [*pinnata* (b)], [*sophia* (b)]. *Diplotaxis* [*muralis*], [*tenuifolia*]. *Draba* (*Erophila*) [*verna*]. *Erucastrum* [*gallicum*]. *Erysimum* [*cheiran-*

thoides], [*repandum*]. *Hesperis* [*matronalis*]. *Lepidium* [*campestre*], [*densiflorum*], [*graminifolium* (b)], [*perfoliatum*], [*ruderale* (b)], [*sativum* (b)], [*smithii* (b)], *virginicum*. *Lobularia* [*maritima*]. *Nasturtium* [*officinale*]. *Neslia* [*paniculata*] (0). *Raphanus* [*raphanistrum*], [*sativus*]. *Rapistrum* [*rugosum*] (0). *Rorippa islandica* [typ.], v. *fernaldiana*, & v. *hispida*, [*prostrata*], [*sylvestris*]. *Sisymbrium* [*altissimum*], [*irio* (b)], [*officinale* v. *leiocarpum*], [*polyceratium* (b)]. *Teesdalia* [*nudicaulis*]. *Thlaspi* [*arvense*].

CAPPARIDACEAE: *Cleome* [*spinosa*], [*viscosa* (b)]. *Polanisia dodecandra* (*graveolens*).

RESEDACEAE: *Reseda* [*alba* (b)], [*lutea*], [*luteola* (b)], [*phyteuma* (b)].

DROSERACEAE: *Drosera rotundifolia.*

PODOSTEMACEAE: *Podostemum ceratophyllum.*

CRASSULACEAE: *Sedum* [*acre*], [*sarmentosum*], *ternatum*. *Tillaea aquatica.*

SAXIFRAGACEAE: *Chrysosplenium americanum*. *Deutzia* [*scabra*]. *Heuchera americana*. *Hydrangea arborescens*, [*paniculata*], [*quercifolia*]. *Mitella diphylla*. *Penthorum sedoides*. *Philadelphus* [*coronarius*]. *Ribes americanum*. *Saxifraga pensylvanica, virginiensis.*

HAMAMELIDACEAE: *Hamamelis virginiana*. *Liquidambar styraciflua.*

PLATANACEAE: *Platanus occidentalis.*

ROSACEAE: *Agrimonia gryposepala, microcarpa, parviflora, pubescens, striata. Amelanchier arborea, canadensis* (*"oblongifolia"*), *laevis*. *Crataegus canbyi, crus-galli* typ. incl. *"bartramiana,"* & v. *capillata, evansiana, holmesiana, intricata* incl. *"bartoniana,"* [*monogyna*], *pennsylvanica, pruinosa* incl. *"comata," "insueta,"* & *"philadelphica," tatnalliana, uniflora*. *Duchesnea* [*indica*]. *Fragaria vesca* [*typ.*] (0) & v. *americana, virginiana* typ. & v. *illinoiensis*. *Geum aleppicum* v. *strictum, canadense, laciniatum* v. *trichocarpum, vernum, virginianum*. *Gillenia trifoliata. Physocarpus opulifolius*. *Potentilla* [*anserina* (b)], [*argentea*], *canadensis, norvegica*, [*recta*], [*reptans*], *simplex*. *Prunus americana*, [*avium*], [*cerasus*], [*domestica*], [*mahaleb*], [*padus*], [*persica*], *serotina*, [*spinosa*], *virginiana*. *Pyrus arbutifolia* typ. & v. *atropurpurea*, [*baccata*], [*communis*], *coronaria*, [*malus*], *melanocarpa*. *Rhodotypos* [*scandens*]. *Rosa* [*canina*], *carolina*, [*eglanteria*], [*multiflora*], *palustris*, [*setigera*]. *Rubus allegheniensis, argutus, baileyanus, depavitus, enslenii, flagellaris, frondosus, hispidus*, [*laciniatus*], *occidentalis, odoratus, pensilvanicus*, [*phoenicolasius*], *semisetosus*. *Sanguisorba canadensis*, [*minor*]. *Spiraea latifolia* (0), *tomentosa.*

Leguminosae: *Aeschynomene* [*virginica* (b)]. *Amorpha* [*fruticosa*]. *Amphicarpa bracteata, comosa. Anthyllis* [*vulneraria* (b)]. *Apios americana. Arachis* [*hypogaea* (b)]. *Baptisia tinctoria. Cassia fasciculata, hebecarpa, nictitans,* [*tora* (b)]. *Cercis canadensis. Clitoria mariana. Coronilla* [*varia*]. *Crotalaria sagittalis. Cytisus* [*scoparius*]. *Desmodium canadense, canescens, cuspidatum, dillenii* (*perplexum*), *glutinosum, laevigatum, marilandicum, nudiflorum, nuttallii, paniculatum, rigidum, rotundifolium. Dolichos* [*lablab*]. *Galactia regularis, volubilis. Galega* [*officinalis*]. *Gleditsia* [*triacanthos*]. *Glycine* [*max*]. *Gymnocladus* [*dioica*]. *Hippocrepis* [*comosa* (b)]. *Lathyrus* [*aphaca* (b)], [*latifolius*], *palustris* typ. & v. *myrtifolius. Lens* [*esculenta*]. *Lespedeza capitata* (v. *vulgaris*), *hirta, intermedia, nuttallii, procumbens, repens,* [*striata*], *violacea, virginica. Lotus* [*corniculatus*]. *Medicago* [*arabica*], [*falcata* (b)], [*hispida* (b)], [*lupulina*], [*sativa*]. *Melilotus* [*alba*], [*altissima*], [*officinalis*], [*sulcata* (b)]. *Ononis* [*spinosa* (b)]. *Ornithopus* [*perpusillus* (b)]. *Phaseolus polystachios* (v. *aquilonius*), [*vulgaris*]. *Pisum* [*sativum*]. *Robinia* [*hispida*], [*pseudo-acacia*], [*viscosa*]. *Scorpiurus* [*sulcatus* (b)]. *Sesbania* [*exaltata* (*macrocarpa*) (b)]. *Strophostyles helvola, umbellata. Stylosanthes biflora. Tephrosia virginiana. Trifolium* [*agrarium*], [*arvense*], [*carolinianum* (b)], [*dubium*], [*fragiferum* (b)], [*hybridum*], [*incarnatum*], [*pratense* typ. & f. *leucochraceum*], [*procumbens*], *reflexum,* [*repens*]; also *T.* [*elegans* (b)], [*lapponicum* (b)], [*maritimum*], & uncertain taxa. *Trigonella* [*besseriana* (b)], [*corniculata* (b)], [*monspeliensis* (b)], etc. Ulex [*europaeus* (b)]. *Vicia* [*angustifolia* typ. & v. *segetalis*], [*dasycarpa*], [*hirsuta*], [*sativa* (b)], [*tetrasperma*], [*villosa*]. *Vigna* [*glabra* (*sinensis*) (b)].

Linaceae: *Linum* [*angustifolium* (b)], *medium* (v. *texanum*), [*perenne* (*lewisii*)], *striatum,* [*usitatissimum*], *virginianum.*

Oxalidaceae: *Oxalis* [*corniculata*], [*europaea*], *filipes, stricta, violacea.*

Geraniaceae: *Erodium* [*cicutarium*]. *Geranium carolinianum,* [*columbinum*], [*dissectum* (b)], *maculatum,* [*molle*], [*pusillum*], *robertianum,* [*sibiricum*].

Zygophyllaceae: *Tribulus* [*terrestris*]. *Zygophyllum* [*fabago* (b)].

Rutaceae: *Citrus* [*sinensis*] (*Poncirus* [*trifoliata*]). *Ptelea trifoliata. Xanthoxylum americanum.*

Simaroubaceae: *Ailanthus* [*altissima*].

Polygalaceae: *Polygala cruciata* (v. *aquilonia*), *nuttallii* (0), *polygama* (0), *sanguinea, senega, verticillata* v. *ambigua.*

Euphorbiaceae: *Acalypha gracilens, rhomboidea, virginica. Croton* [*glandulosus* v. *septentrionalis*], [*lindheimeranus*], [*punctatus* (b)]. *Euphorbia corol-*

lata, [*cyparissias*], *dentata,* [*esula*], [*helioscopia* (b)], [*lathyris*], *maculata* (GM), [*marginata*], [*peplis* (b)], [*peplus*], [*polygonifolia* (b)], [*segetalis* (b)], [*serpens* (b)], *supina* (GM), *vermiculata. Mercurialis* [*annua* (b)]. *Phyllanthus* [*caroliniensis*]. *Ricinus* [*communis* (b)].

CALLITRICHACEAE: *Callitriche deflexa* v. *austinii, heterophylla, palustris,* [*stagnalis*].

LIMNANTHACEAE: *Floerkea proserpinacoides.*

ANACARDIACEAE: *Rhus copallina* (v. *latifolia*), *glabra, radicans* typ. & f. *malachotrichocarpa, typhina.*

AQUIFOLIACEAE: *Ilex opaca, verticillata.*

CELASTRACEAE: *Celastrus* [*orbiculatus*], *scandens. Euonymus* [*alatus*], *americanus, atropurpureus,* [*europaeus*].

STAPHYLEACEAE: *Staphylea trifolia.*

ACERACEAE: *Acer* [*campestre*], [*ginnala*], *negundo,* [*platanoides*], [*pseudoplatanus*], *rubrum* typ. & v. *trilobum, saccharinum, saccharum* typ. & v. *rugelii, spicatum.*

HIPPOCASTANACEAE: *Aesculus* [*glabra*], [*hippocastanum*].

SAPINDACEAE: *Cardiospermum* [*halicacabum*].

BALSAMINACEAE: *Impatiens* [*balsamea*], *biflora* (*"capensis"*), *pallida.*

RHAMNACEAE: *Ceanothus americanus. Rhamnus* [*cathartica*], [*frangula*].

VITACEAE: *Parthenocissus quinquefolia,* [*tricuspidata*]. *Vitis aestivalis, labrusca, riparia,* [*vinifera*], *vulpina.*

TILIACEAE: *Tilia americana.*

MALVACEAE: *Abutilon* [*theophrasti*]. *Althaea* [*officinalis*], [*rosea*]. *Anoda* [*cristata*]. *Gossypium* [*herbaceum* (b)]. *Hibiscus moscheutos,* [*syriacus*], [*trionum*]. *Kosteletzkya* [*virginica* (b)]. *Malva* [*moschata*], [*neglecta*], [*rotundifolia* (b)], [*sylvestris*]. *Modiola* [*caroliniana* (b)]. *Sida* [*spinosa*].

GUTTIFERAE: *Ascyrum* (alternatively *Hypericum*) *hypericoides. Hypericum* (*Sarothra*) *gentianoides. Hypericum mutilum,* [*perforatum*], *punctatum, spathulatum* (*"prolificum"*). *Triadenum virginicum.*

ELATINACEAE: *Elatine americana, minima.*

CISTACEAE: *Helianthemum canadense. Lechea leggettii, minor, racemulosa, villosa.*

VIOLACEAE: *Hybanthus concolor. Viola affinis* typ. & albino f., [*arvensis*], *blanda, conspersa, cucullata, emarginata, fimbriatula, hirsutula, incognita, lanceolata, pallens, palmata, pedata* typ. & one-color f., *pensylvanica,* × *porteriana,* *primulifolia, pubescens, rafinesquii, rotundifolia, sagittata, sororia* typ., albino & glabrescent ff., *stoneana, striata,* [*tricolor*], *triloba* typ. & v. *dilatata.*

CACTACEAE: *Opuntia compressa.* (*"humifusa"*, GM).

ELAEAGNACEAE: *Elaeagnus* [*angustifolia*], [*umbellata*].

LYTHRACEAE: *Ammannia* [*coccinea*]. *Cuphea petiolata. Decodon verticillatus* (0). *Lythrum alatum, hyssopifolia,* [*salicaria*].

NYSSACEAE (Here in GM sequence): *Nyssa sylvatica.*

MELASTOMACEAE: *Rhexia virginica.*

ONAGRACEAE: *Circaea lutetiana* v. *canadensis. Epilobium angustifolium, coloratum,* [*hirsutum*], *leptophyllum* (0). *Gaura biennis. Godetia* [*quadrivulnera* (b)]. *Jussiaea* [*repens* (v. *glabrescens*)]. *Ludwigia alternifolia, palustris* (v. *americana*). *Oenothera biennis, fruticosa, laciniata, perennis, tetragona.*

HALORAGACEAE: *Myriophyllum humile. Proserpinaca palustris.*

ARALIACEAE: *Aralia nudicaulis, racemosa, spinosa. Panax quinquefolius* (0), *trifolius.*

UMBELLIFERAE: *Aegopodium* [*podagraria*]. *Aethusa* [*cynapium*]. *Ammi* [*visnaga* (b)]. *Anethum* [*graveolens*]. *Angelica venenosa. Anthriscus* [*sylvestris* (b)]. *Apium* [*graveolens*]. *Bupleurum* [*rotundifolium*]. *Carum* [*carvi*]. *Caucalis* [*daucoides* (b)], [*latifolia* (b)]. *Celeri* [*graveolens*]. *Chaerophyllum procumbens. Cicuta bulbifera, maculata. Conium* [*maculatum*]. *Coriandrum* [*sativum* (b)]. *Cryptotaenia canadensis. Daucus* [*carota* typ. & f. *roseus*]. *Eryngium* [*aquaticum*]. *Foeniculum* [*vulgare*]. *Heracleum maximum* (*"lanatum"*). *Hydrocotyle americana,* [*sibthorpioides* (*"rotundifolia"*)], *umbellata. Osmorhiza claytoni, longistylis* typ. & v. *villicaulis. Oxypolis rigidior. Pastinaca* [*sativa*]. *Ptilimnium* [*capillaceum* (b)]. *Sanicula canadensis, gregaria, marilandica, trifoliata. Scandix* [*pecten-veneris* (b)]. *Sium suave. Taenidia integerrima. Thaspium barbinode, trifoliatum. Zizia aptera, aurea.*

CORNACEAE: *Cornus amomum* typ. & v. *schuetzeana* (*C. obliqua* GM), *florida, foemina,* [*stolonifera*].

DICOTS, UNITED-PETAL

CLETHRACEAE: *Clethra alnifolia.*

ERICACEAE: (incl. PYROLACEAE of GM): *Chimaphila maculata, umbellata* (v. *cisatlantica*). *Epigaea repens. Gaultheria procumbens. Gaylussacia baccata* typ. & f. *glaucocarpa, frondosa. Lyonia ligustrina, mariana. Monotropa hypopithys, uniflora. Pyrola elliptica, rotundifolia* v. *americana, secunda, virens* v. *convoluta.*

Rhododendron periclymenoides (*nudiflorum*) typ. & f. *glandiferum, viscosum* typ. & v. *glaucum* (0). *Vaccinium angustifolium, atrococcum, corymbosum* typ. & v. *glabrum, macrocarpon, stamineum* typ., v. *caesium* & v. *neglectum, vacillans* typ. & f. *crinitum.*

PRIMULACEAE: *Anagallis* [*arvensis* typ. & v. *coeruleum*]. *Lysimachia ciliata,* [*clethroides*], [*nummularia*], *quadrifolia, terrestris,* [*vulgaris*]. *Samolus parviflorus. Trientalis borealis.*

EBENACEAE: *Diospyros virginiana.*

STYRACACEAE: *Halesia* [*carolina*].

OLEACEAE: *Chionanthus virginicus* (0). *Fraxinus americana* typ., v. *biltmoreana* & v. *juglandifolia,* [*excelsior*], *nigra, pennsylvanica* typ. & v. *subintegerrima* (*"lanceolata"*). *Ligustrum* [*obtusifolium*].

LOGANIACEAE: *Polypremum* [*procumbens* (b)].

GENTIANACEAE: *Bartonia virginica. Gentiana clausa, crinita, villosa. Obolaria virginica. Sabatia angularis.*

APOCYNACEAE: *Amsonia* [*tabernaemontana*]. *Apocynum androsaemifolium, cannabinum* typ., v. *glaberrimum,* & v. *pubescens,* × *medium, sibiricum. Trachelospermum* [*difforme* (b)] (0). *Vinca* [*minor*].

ASCLEPIADACEAE: *Acerates* (alternatively *Asclepias*) *viridiflora* typ. & v. *lanceolata. Asclepias amplexicaulis* (0), *exaltata, incarnata* typ. & v. *pulchra, purpurascens, quadrifolia, rubra* (0), *syriaca, tuberosa, variegata, verticillata* (0). *Cynanchum* [*nigrum*]. *Matelea* (*Gonolobus*) *obliqua. Periploca* [*graeca*].

CONVOLVULACEAE: *Calystegia* (alternatively *Convolvulus*) *fraterniflora,* [*hederacea* (*wallichiana* GM)], [*pubescens* (*pellitus* v. *anestius* GM)], *sepium* (ssp. *americana*), *spithamaea. Convolvulus* [*arvensis*]. *Cuscuta campestris, compacta, gronovii* typ. & v. *latiflora, pentagona. Ipomoea* [*batatas*], [*coccinea*], [*hederacea*], [*lacunosa*], [*littoralis* (b)], *pandurata,* [*purpurea*], [*sagittata* (b)], [*sinuata* (b)].

POLEMONIACEAE: *Collomia* [*linearis*]. *Navarretia* [*squarrosa*]. *Phlox* [*divaricata*], *maculata,* [*paniculata*]. *Polemonium reptans.*

HYDROPHYLLACEAE: *Ellisia nyctelea. Hydrophyllum virginianum. Phacelia purshii.*

BORAGINACEAE: *Amsinckia* [*barbata* (b)], [*intermedia* (b)]. *Anchusa* [*officinalis* (b)]. *Asperugo* [*procumbens* (b)]. *Cynoglossum* [*officinale*], *virginianum. Echium* [*plantagineum* (b)], [*vulgare*]. *Hackelia virginiana. Heliotropium* [*curassavicum* (b)], [*europaeum*], [*indicum* (b)] (0), [*supinum* (b)], [*undulatum* (b)].

Lappula [*echinata*], [*patula* (b)], [*prostrata* (b)], [*redowskii* v. *occidentalis* (b)]. *Lithospermum* [*arvense*], [*officinale*] (0). *Lycopsis* [*arvensis* (b)]. *Mertensia virginica*. *Myosotis* [*arvensis*], *laxa*, [*scorpioides*], [*stricta*], *verna*, [*versicolor*]. *Nonea* [*rosea*]. *Symphytum* [*officinale*].

VERBENACEAE: *Lippia* (*Phyla*) [*lanceolata* v. *incognita*], [*nodiflora* (b)]. *Verbena* [*bracteata*], [*canadensis* (b)], *hastata*, [*officinalis*], *simplex*, [*stricta*], *urticifolia* typ. & v. *leiocarpa*.

LABIATAE: *Agastache nepetoides*, *scrophulariaefolia* typ. & v. *mollis*. *Ajuga* [*reptans*]. *Ballota* [*nigra* (b)]. *Collinsonia canadensis*. *Cunila origanoides*. *Galeopsis* [*ladanum* (b)], [*tetrahit* v. *bifida*]. *Glechoma* [*hederacea*]. *Hedeoma pulegioides*. *Isanthus brachiatus* (0). *Lamium* [*amplexicaule*], [*maculatum*], [*purpureum*]. *Leonurus* [*cardiaca*], [*marrubiastrum*], [*sibiricus*]. *Lycopus americanus*, [*europaeus*], *uniflorus*, *virginicus* incl. × *sherardii*. *Marrubium* [*vulgare*]. *Melissa* [*officinalis*]. *Mentha* [*aquatica* (b)], *arvensis* typ. & v. *villosa* ("*canadensis*"), [*cardiaca*], [*crispa*] (0), [*longifolia*], [*piperita*], [*pulegium* (b)], [*rotundifolia*], [*spicata*]. *Monarda clinopodia* typ. & v. *media*, *didyma*, *fistulosa* v. *mollis*, *punctata*. *Nepeta* [*cataria*]. *Origanum* [*vulgare*]. *Perilla* [*frutescens*]. *Physostegia virginiana*. *Prunella vulgaris* [typical], v. *lanceolata* typ. & f. *candida*. *Pycnanthemum incanum*, *muticum*, *tenuifolium*, *verticillatum*, *virginianum*. *Salvia lyrata*, [*sclarea* (b)], [*verbenacea* (b)], [*verticillata*]. *Satureja* [*calamintha* (b)], [*hortensis*], *vulgaris* (v. *neogaea*). *Scutellaria elliptica*, *epilobiifolia* (*galericulata*), *integrifolia*, *lateriflora*, *nervosa*, *parvula* (v. *leonardii*). *Stachys* [*annua* (b)], [*arvensis* (b)], [*palustris*], [*sylvatica* (b)], *tenuifolia* typ. & v. *platyphylla*. *Teucrium canadense* (v. *virginicum*), [*occidentale* (b)], [*orientale* (b)]. *Thymus* [*serpyllum*]. *Trichostema dichotomum*, *lineare* (0).

SOLANACEAE: *Datura* [*ferox*], [*innoxia*], [*stramonium*]. *Hyoscyamus* [*albus* (b)], [*niger* (b)]. *Lycium* [*halimifolium*]. *Lycopersicum* [*esculentum*]. *Nicandra* [*physalodes*]. *Petunia* [*axillaris*], [*hybrida*], [*parviflora* (b)], [*violacea*]. *Physalis* [*alkekengii*], *heterophylla* typ. & v. *ambigua*, [*ixocarpa* (b)], [*pruinosa*], *subglabrata*, [*virginiana*] (0). *Solanum americanum* (*nigrum*), *carolinense*, [*dulcamara*], [*melongena* (b)], [*rostratum*], [*sisymbriifolium* (b)], [*tuberosum*], [*villosum* (b)].

SCROPHULARIACEAE: *Agalinis* (*Gerardia* GM), [*fasciculata* (b)], *purpurea*, *tenuifolia*. *Antirrhinum* [*majus*], [*orontium* (b)]. *Aureolaria* (*Gerardia* GM) *flava*, *pedicularia*, *virginica*. *Castilleia coccinea*. *Chaenorrhinum* [*minus*]. *Chelone glabra*. *Collinsia* [*parviflora*]. *Conobaea* [*multifida*]. *Cymbalaria* [*muralis*].

Gratiola neglecta. Kicksia [*elatine*], [*spuria* (b)]. *Limosella subulata. Linaria canadensis,* [*supina* (b)], [*vulgaris*]. *Lindernia dubia* typ. & v. *inundata. Mazus* [*japonicus*], [*reptans*]. *Melampyrum lineare. Micranthemum micranthemoides. Mimulus alatus,* [*moschatus*] (0), *ringens. Pedicularis canadensis, lanceolata* (0). *Penstemon digitalis, hirsutus. Scrophularia* [*aquatica* (b)], [*canina* (b)] (0), *lanceolata, marilandica. Verbascum* [*blattaria*], [*lychnitis*], [*nigrum* (b)], [*phlomoides*], [*sinuatum* (b)], [*thapsus*]. *Veronica* [*agrestis* (b)], *americana,* [*anagallis-aquatica* typ. & f. [*anagalliformis*], [*arvensis*], [*chamaedrys*], [*filiformis*], [*hederaefolia*], [*longifolia*], *officinalis, peregrina* typ. & v. *xalapensis,* [*persica*], [*polita*], *scutellata,* [*serpyllifolia*]. *Veronicastrum virginicum.*

BIGNONIACEAE: *Campsis radicans. Catalpa* [*bignonioides*]. *Paulownia* [*tomentosa*].

OROBANCHACEAE: *Conopholis americana. Epifagus virginiana. Orobanche* [*minor*], *uniflora.*

LENTIBULARIACEAE: *Utricularia gibba* (0), *vulgaris.*

ACANTHACEAE: *Justicia americana.*

PHRYMACEAE: *Phryma leptostachya.*

PLANTAGINACEAE: *Plantago aristata,* [*coronopus* (b)], [*heterophylla* (b)], [*indica*], [*lanceolata*] [*major* typ. & f. *rosea*], [*media* (b)], [*pusilla*], *rugelii, virginica.*

RUBIACEAE: *Asperula* [*arvensis* (b)]. *Cephalanthus occidentalis. Diodia teres,* [*virginiana* f. *hirsuta* (b)]. *Galium aparine, asprellum* (0), *circaezans* (v. *hypomalacum*), *concinnum, lanceolatum,* [*mollugo*], *obtusum, palustre* (0), *pilosum* (0), *tinctorium,* [*tricorne* (b)], *triflorum,* [*verum*]. *Hedyotis* (*Houstonia*) *coerulea, longifolia* (0). *Mitchella repens. Richardia* [*scabra* (b)]. *Sherardia* [*arvensis*].

CAPRIFOLIACEAE: *Diervilla lonicera. Lonicera* [*japonica* typ. & v. *chinensis*], [*morrowi*], *sempervirens,* [*tatarica*]. *Sambucus canadensis. Triosteum angustifolium* (0), *perfoliatum. Viburnum acerifolium, dentatum* (GM), *lentago,* [*opulus*], *prunifolium, recognitum* (GM), [*sieboldii*], [*tomentosum*], [*trilobum*]

VALERIANACEAE: *Valerianella intermedia,* [*olitoria*], *patellaria.*

DIPSACACEAE: *Dipsacus* [*laciniatus*], [*sylvestris*].

CUCURBITACEAE: *Citrullus* [*vulgaris*]. *Cucumis* [*melo*]. *Cucurbita* [*pepo*]. *Ecbalium* [*agreste* (b)]. *Echinocystis lobata. Sicyos angulatus.*

CAMPANULACEAE: *Campanula americana, aparinoides,* [*rapunculoides*]. *Jasione* [*montana* (b)]. *Platycodon* [*grandiflorum*]. *Specularia* [*speculum* (b)]. *Triodanis* (*Specularia* GM) [*biflora* (b)], *perfoliata.*

CAMPANULACEAE, LOBELIA DIV.: *Lobelia cardinalis, inflata, siphilitica, spicata* typ. & v. *campanulata.*

COMPOSITAE: CHICORY SUBFAMILY

Arnoseris [*minima* (b)]. *Cichorium* [*intybus* typ. & f. *album*]. *Crepis* [*capillaris*], [*tectorum* (b)]. *Hieracium* [*aurantiacum*], [*flagellare*], [*florentinum*], *gronovii, paniculatum,* [*pratense*], [*sabaudum*], *scabrum, venosum,* [*vulgatum*]. *Hypochoeris* [*glabra* (b)], [*radicata*]. *Ixeris* (*Lactuca*) [*stolonifera*]. *Krigia biflora, virginica. Lactuca biennis, canadensis* typ., v. *latifolia* & v. *longifolia, floridana* typ. & v. *villosa, hirsuta* (0), [*saligna*], [*scariola* typ. & v. *integrata*]. *Lapsana* [*communis*]. *Leontodon* [*autumnalis*], [*leysseri*]. *Picris* [*echioides* (b)], [*hieracioides*]. *Prenanthes altissima, serpentaria* typ. & f. *simplicifolia, trifoliolata. Pyrrhopappus* [*carolinianus* (b)]. *Sonchus* [*arvensis*], [*asper*], [*oleraceus*], [*uliginosus*]. *Taraxacum* [*laevigatum*], [*officinale*]. *Tragopogon* [*major*], [*porrifolius*], [*pratensis*].

COMPOSITAE: ASTER SUBFAMILY

Achillea lanulosa + *millefolium,* [*ptarmica*]. *Actinomeris* [*Verbesina*] *alternifolia. Ambrosia artemisiifolia, trifida* typ. & f. *integrifolia. Anacyclus* [*tomentosus* (b)]. *Anaphalis margaritacea. Antennaria fallax, neglecta, neodioica, plantaginifolia. Anthemis* [*arvensis*], [*cotula*]. *Arctium* [*minus*], [*tomentosum*]. *Artemisia* [*absinthium* (b)], [*annua*], [*biennis*], [*ludoviciana*] (0), [*pontica*], [*vulgaris*]. *Aster cordifolius, divaricatus, infirmus* (0), *laevis, lateriflorus, linariifolius, macrophyllus* (0), *novae-angliae* typ. & f. *roseus, patens* typ. & v. *phlogifolius, pilosus* typ. & v. *demotus, prenanthoides, puniceus* typ. & v. *calvus, schreberi, simplex* typ. & v. *ramosissimus,* [*subulatus* (b)], [*tripolium* (b)], *umbellatus* (0), *undulatus, vimineus* typ. & v. *subdumosus. Baccharis halimifolia. Bellis* [*perennis*]. *Bidens bidentoides, bipinnata, cernua, comosa, connata* v. *petiolata, coronata, frondosa* typ. & v. *anomala, laevis,* [*pilosa* v. *bimucronata* & *radiata* (b)], *polylepis, vulgata. Cacalia atriplicifolia. Calendula* [*officinalis*]. *Carduus* [*acanthoides*], [*nutans*], [*tenuiflorus* (b)]. *Centaurea* [*calcitrapa* (b)], [*cyanus*], [*jacea*], [*melitensis* (b)], [*nigra* typ. & v. *radiata*], [*solstitialis*]. *Chrysanthemum* [*leucanthemum* v. *pinnatifidum*], [*morifolium*], [*parthenium*], [*segetum* (b)]. *Chrysopsis* (*Heterotheca*) *mariana. Cirsium* [*arvense* typ., f. *mite* & v. *vestitum*], *discolor, horridulum, pumilum,* [*vulgare*]. *Coreopsis* [*lanceolata*], [*tinctoria*]. *Cosmos* [*bipinnatus*], [*sulphureus*]. *Eclipta alba. Elephantopus carolinianus.*

Erechtites hieracifolia. Erigeron annuus, canadensis, [*divaricatus*], *philadelphicus, pulchellus, strigosus* typ. & v. *beyrichii,* & f. *discoideus. Eupatorium* [*capillifolium* (b)], *coelestinum, dubium, fistulosum, hyssopifolium, perfoliatum* typ. & f. *purpureum, pilosum, pubescens, purpureum, rugosum* typ. & [v. *tomentellum*], *serotinum, sessilifolium. Filago* [*minima* (b)]. *Gaillardia* [*aristosa* (*pulchella*)]. *Galinsoga* [*ciliata*], [*parviflora*]. *Gnaphalium obtusifolium,* [*peregrinum*], *purpureum, uliginosum. Grindelia* [*squarrosa* (b)]. *Helenium* [*amarum* (*tenuifolium*)], *autumnale,* [*nudiflorum*], [*quadridentatum* (b)]. *Helianthus* [*annuus*], [*debilis* v. *cucumerifolius*], *decapetalus, divaricatus, giganteus,* [*grosseserratus*], [*laetiflorus*], [*maximilianii*], [*mollis* (b)], *tuberosus. Heliopsis helianthoides. Heterotheca* [*subaxillaris* (b)]. *Inula* [*helenium*]. *Iva* [*frutescens* v. *oraria* (b)], [*xanthifolia*]. *Kuhnia eupatorioides* (0). *Liatris spicata. Madia* [*sativa*]. *Matricaria* [*chamomila*], [*inodora* (b)], [*suaveolens*]. *Mikania scandens. Onopordum* [*acanthium* (b)]. *Parthenium* [*hysterophorus* (b)]. *Petasites* [*hybridus*] (0). *Pluchea* [*camphorata* (b)]. *Rudbeckia hirta* v. *pulcherrima* (*fulgida*), *laciniata, speciosa, triloba. Scolymus* [*hispanicus* (b)]. *Senecio aureus* v. *gracilis* & v. *intercursus,* [*erucifolia* (b)], [*jacobea*], *obovatus, smallii,* [*sylvaticus* (b)], [*vulgaris*]. *Sericocarpus asteroides, linifolius. Silphium* [*perfoliatum*]. *Silybum* [*marianum* (b)]. *Solidago altissima, arguta, bicolor* typ. & glabrescent v., *caesia, canadensis* v. *hargeri, flexicaulis, gigantea* typ. & v. *leiophylla, graminifolia* v. *nuttallii, juncea, nemoralis, odora, puberula, rugosa* typ. & v. *aspera, sempervirens, speciosa* (0), *squarrosa, tenuifolia, ulmifolia. Tagetes* [*erecta*], [*patula*]. *Tanacetum* [*vulgare*]. *Tussilago* [*farfara*]. *Verbesina* [*encelioides* (b)]. *Vernonia glauca, noveboracensis. Xanthium chinense, italicum,* [*oviforme*], *pensylvanicum,* [*spinosum* typ. & v. *inerme*].

William P. C. Barton's Compendium of 1818 indicated around 900 taxa to grow in Philadelphia County itself, as well as a considerable number in adjacent counties of Pennsylvania and New Jersey. In his preface he stated that he had personally collected all but about 20 of these, — a remarkable achievement for a period when transportation facilities were limited.

For identification he consulted the taxonomic literature of the day, and made comparisons with specimens in Muhlenberg's herbarium. The modern equivalents of most of his names can be figured out, although there are a few "mysteries". Thus he included a "*Chara vulgaris;*" this genus name belongs to an alga, yet his plant bore a many-seeded berry. From the Wissahickon valley he reported a "*Pinus nigra,*" — now classed as *Picea mariana;* but this is the Black Spruce of northern bogs, and there is no other record of its occurrence at such a low altitude so far south. The presence here of several other far northern taxa as well as a few rather southern ones he included seems so improbable that they are considered to have been misidentified.

Already in Barton's day plants from other lands were becoming naturalized here, about 130 appearing in his Philadelphia list. Some like *Origanum vulgare* had made themselves so thoroughly at home that he held them to be really indigenous; others like *Allium vineale* were even then "pestiferous." It is rather remarkable that taxa with seemingly little basis for aggressiveness were already established by 1818, like the following ten: *Heleochloa schoenoides* (*"Crypsis virginica"*), *Hemerocallis fulva, Alnus glutinosa, Ranunculus sceleratus, Rorippa sylvestris, Crataegus monogyna, Conium maculatum, Nicandra physalodes, Catalpa bignonioides,* and *Filago minima.*

As the result of the activities of the collectors of the subsequent 150 years, the number of records for the County has now increased to 2,075. Of these 885 are introduced, 235 of them primarily on the ballast dumps along the river. Urban expansion has of course exterminated many of them, but finds can still be made in relatively undisturbed areas of Fairmount Park and the valleys of the Schuylkill River, and Wissahickon and other creeks. The pages of this journal, the name of which commemorates that of the first compiler of a Philadelphia flora, are always open for reports of new discoveries.

The Philadelphia Botanical Club, 1968

DR. EDGAR T. WHERRY, *Honorary President*

DR. RALPH M. SARGENT, *President*
DR. ALFRED E. SCHUYLER, *Vice Pres.*
MRS. ROBERT ROBERTSON, *Secretary*
MR. WILLIAM L. FREYBURGER, *Treasurer*
MR. BAYARD LONG, *Curator Emeritus*
DR. EDGAR T. WHERRY, *Editor*

NEW MEMBERS

DR. NORMA GOOD, Department of Biology, Rutgers University, 3rd & Wilson, Camden, N.J. 08102
DR. RALPH GOOD, Department of Biology, Rutgers University, 3rd & Wilson, Camden, N.J. 08102
MRS. W. E. HUNT, 222 Kent Rd., Ardmore, Pa. 19003
JOHN D. SCOTT, Crestview Drive, Springfield, Pa. 19064
WILLIAM E. SHULL, JR., 1105 Salem Ave., Burlington, N.J. 08016

CHANGE OF ADDRESS

MRS. ROBERT A. BRADEL, Braddock's Mill Lake, R.D. 2, Marlton, N.J. 08053

JEW-MING CHAO, Dept. of Biology, Philadelphia College of Pharmacy & Science, 43rd & Kingsessing, Philadelphia, Pa. 19104

DAVID L. WILLIAMS, 635 Foothill Rd., Somerville, N.J. 08876

DECEASED

CHARLES H. VAN HOUSEN .... November 28, 1968

Program of Meetings

Date	*Subject*	*Speaker*	*Attendance*
Date	*Subject*	*Speaker*	*Attendance*
Jan. 25	Plant Drugs from the Sea	Dr. Ara Der Marderosian	30
Feb. 22	A Botanical Journey to the American West and Southwest	Dr. Stevens Heckscher	29
Mar. 28	A Botanist in South America	Dr. John M. Fogg, Jr.	29
May 23	Exploring the Vegetation of Delaware	Charles E. Mohr	29
Sept. 26	Reports by Members on Summer Activities		21
Oct. 24	The Herbarium: Its Nature, Its Organization, and Its Uses	Hans Wilkens	26
Nov. 21	African Contrasts	Mrs. James B. Woodford	31
Dec. 19	Our Fascinating Ferns	Dr. Edgar T. Wherry	35

Trips

Date	*Locality*	*Attendance*
Apr. 28	Bowman's Hill Wild Flower Preserve, Pa.	40
Oct. 6	Island Beach State Park, N.J.	16

A 5 73

No. 39 1969

BARTONIA

JOURNAL OF THE PHILADELPHIA BOTANICAL CLUB

CONTENTS

Bayard Long (1885-1969) .... John M. Fogg, Jr. 1

Bayard Long — An Appreciation .... Alfred E. Schuyler 7

Bayard Long The Curator .... Robert L. Schaeffer, Jr. 8

The Effect of Urban Conditions on the Trees in the Vicinity of Logan Circle .... Ludwig Koelneau 12

Book Review .... Edgar T. Wherry 16

The Philadelphia Botanical Club, 1969 17

New Staff Member in Herbarium 20

Published by the Club
Academy of Natural Sciences, 19th & Parkway
Philadelphia, Pennsylvania 19103
Subscription Price, $2.00. Back Numbers, $2.00 each.
Issued November 4, 1970

Missouri Botanical
DEC 1 - 1970
Garden Library

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

NO. 39 1969

Bayard Long (1885-1969) [1]

JOHN M. FOGG

Arboretum of the Barnes Foundation

Bayard Henry Long was born on September 22, 1885, and died on June 9, 1969. His father was John Luther Long, a Philadelphia lawyer who was born and raised in Hanover, York County, Pennsylvania.

The elder Long's sister had gone as a missionary to Japan in the early 1890's and had married the Rev. J. H. Correll. A few years later the Correlis returned to Philadelphia where Bayard's father had established a law practice. Over dinner one evening the Correlis related to Long the story of an American naval officer who had married a geisha girl in Nagasaki. Such marriages were then considered temporary arrangements, which could easily be annulled. The bride in this case, who had given birth to a child, took a different view of the matter and, when her "husband" returned to Japan with his American wife, killed herself.

John Luther Long, who had turned to writing as a sideline, added a few embellishments to this story and it was published in the Century Magazine in 1898. Later David Belasco adapted it as a play which was a success on Broadway in 1900 and at Belasco's suggestion Giacomo Puccini used the story as the basis for his opera "Madame Butterfly" which is recorded as a failure in its premiere in Milan in 1904, but later, after revision, became a great success and is still a standard offering in the repertoire of the world's great opera companies.

The elder Long had established himself as a novelist and playwright and one of his most successful achievements was "The Darling of the Gods" produced by Belasco and starring Blanche Bates. Long died October 31, 1927.

---

[1] Reprinted from Rhodora, Vol. 72, 789, 1970.

Very little is known of the early years and young manhood of John Luther Long's son, Bayard. We know that he attended Cheltenham High School, not far removed from his father's house in Ashbourne (now Elkins Park), a suburb of Philadelphia, and that upon his graduation in 1904 he was the Orator of his class. He then attended the University of Pennsylvania, where he majored in Botany and in June, 1908, was awarded the degree of Bachelor of Science in Biology. He later registered in the Graduate School of Arts and Sciences at the University, but apparently did not receive a graduate degree.

Just when Bayard Long became affiliated with the Philadelphia Academy of Natural Sciences the Academy's records do not reveal, but it was probably while he was still taking courses in Botany at the University. We know that he became a member of the Philadelphia Botanical Club in 1906 and that in 1913 he was elected Curator of the Club's Local Herbarium, a position to which he was annually re-elected until the year of his death. Thus, his custodianship of one of the country's finest local herbaria spanned an interval of 56 years. At no time during his career did Bayard accept any salary from the Academy.

The Philadelphia Botanical Club had been founded in December, 1891, by a group of amateur botanists who were enthusiastically devoted to studying the flora of the Philadelphia local area. By their definition this area comprised all of southern New Jersey and southeastern Pennsylvania, as well as Harford County, Maryland and New Castle County, Delaware.

For many years members of the Club explored and collected in the numerous plant habitats included in this area, e.g.; the Pine Barrens of New Jersey, the glaciated portions of Northampton County, the serpentine outcrops of Chester and Lancaster Counties, etc. Long was a frequent member of these expeditions and early demonstrated his keenness as an observer and his superb ability as a collector.

The early issues of *Bartonia,* the official publication of the Club, were filled with accounts of the exciting finds made on these trips and the cases in the Local Herbarium (housed at the Academy) were soon bulging with specimens from all corners of the local area.

It is doubtful that anyone ever possessed a higher standard for the quality of an herbarium specimen than Bayard Long. Every leaf had to be laid out flat, every inflorescence properly displayed, every flower part clearly shown. Extra flowers and loose fruits and seeds were placed in pockets affixed to the sheet. Root systems (collected in their entirety whenever possible) were scrupulously clean, habitats were accurately described and localities were identified to the nearest tenth of a mile and closest compass point. All of this seems the more remarkable when it is realized that Long collected close to 80,000 numbers, not including collections made as a member of Fernald's expeditions.

It was inevitable that a man of Long's keen intelligence and critical judgment should come to the attention of Professor M. L. Fernald. In 1911 Fernald wrote,

Bayard Long, Hampden Lake, New Jersey, August 1940.

"since Mr. Long has on other occasions shown keen discrimination in his study of the Cyperaceae, it is a pleasure permanently to associate his name with the new *Scirpus Longii* n. sp." (Rhodora 13: 6. 1911.) During the years that followed Fernald named sixteen other plants in Long's honor.

Between July 2 and September 9, 1920, Long joined the Gray expedition under Fernald to Nova Scotia (see Rhodora 23: 94. 1921) and in 1924 and 1925 he was a member of the party which explored Newfoundland. It was in his "Journal of the Summer of 1925" that Fernald stated, "If there is a keener collector or discoverer of native plants than Bayard Long I have yet to meet him." (Rhodora 28: 94. 1926.)

I first met Bayard Long in the autumn of 1921. At that time I had had no formal training in botany, but was beginning to be interested in plants and was attempting to identify the species that I encountered in the suburbs of Philadelphia. I had purchased a copy of the 7th edition of Gray's Manual and found it rather hard going. In desperation I took some of my puzzles in to the Academy of Natural Sciences and inquired of a guard where I would find a botanist. I was directed to the Herbarium of the Philadelphia Botanical Club. There I met Mr. Long who quickly solved my problems, encouraged me to continue collecting and advised me to join the Philadelphia Botanical Club, which I promptly did. Thus began an association which lasted for more than 40 years — a friendship cemented by countless field trips in the local and more distant areas.

As an undergraduate student in the early 20's I had become fascinated by the writings of M. L. Fernald and had read every word he had published in the pages of Rhodora. In particular was I excited by the accounts of his expeditions to New Brunswick, the Gaspé Peninsula, Nova Scotia and Newfoundland. I begged Long, who had already been on several of these trips, to ascertain whether there would ever be an opportunity for me to become a member. It was entirely through his intercession that Professor Fernald invited me to join Long and him on a brief excursion to Newfoundland in 1926.

This was the summer of the Fourth International Congress at Ithaca, so we were unable to leave for Newfoundland until late in August. Three years later, in the summer of 1929, I was again privileged to join Fernald (with whom I had now taken my Doctor's degree) and Long on a much longer tour.

The events of these two trips were summarized by Fernald in an article entitled, "Recent Discoveries in the Newfoundland Flora", which occupied all twelve numbers of Rhodora for 1933 (Vol. 35).

In the 1930's I accompanied Fernald and Long on two collecting trips to the Coastal Plain of southeastern Virginia. The results of these trips were also published by Fernald in Rhodora.

Bayard Long's intellectual qualifications were such that he could doubtless have succeeded in any field of endeavor which appealed to him. He was an ardent philatelist, his specialty being British Colonies, a subject area which calls for keen powers of observation. His tastes in literature and music were exalted and he had a deep appreciation of natural beauty.

With it all Long was an extremely modest and almost painfully self-effacing individual. He appeared to shrink from human contacts, but once convinced of a person's sincere desire to learn, no effort was too great, no demands on his time too exacting for him to render assistance and share his prodigious knowledge. Certainly no one has ever possessed his intimate acquaintance with the local flora, but he was equally at home in the field in Newfoundland and Virginia.

Long's first serious illness occurred in the early 1960's, although he continued to work at the Academy until the fall of 1962. Afterwards he was confined to his home in Elkins Park, where almost until the very end he continued by letter and telephone to answer the questions of those who called upon him for help.

PUBLICATIONS OF BAYARD LONG

1. Range extension of *Scirpus Smithii* var. *setosus*. Rhodora **12**:155-156. 1910.
2. *Pinus serotina* Michx. in southern New Jersey and other local notes. Bartonia. **2**: 17-21. 1910.
3. Certain species becoming well established at Ashbourne and elsewhere near Philadelphia. Bartonia **3**:22-25. 1911.
4. *Galium labradoricum* in Pennsylvania. Rhodora. **14**:199, 1-200. 1912.
5. Some results of recent field work in the Cape May peninsula. Bartonia. **4**:14-19. 1912.
6. Range extension in *Antennaria*. Rhodora. **15**:117-122. 1913.
7. *Ludwigiantha brevipes* Long n. sp. Britton & Brown Illus. Flora Ed. 2. II:586. 1913.
8. (With Fernald) The American variations of *Potentilla palustris*. Rhodora. **16**:5-11, *pl. 106*. 1914.
9. On the occurrence of Keeled Garlic in America. Bartonia. **7**:6-16. 1915.
10. Discovery of *Prunus cuneata* in southern New Jersey. Rhodora. **18**:66-70. 1916.
11. A belated correction. Rhodora. **18**:142-143. 1916.
12. *Delphinium consolida* in America, with a consideration of the status of *Delphinium Ajacis*. Rhodora. **18**:169-177. 1916.
13. Range of *Carex novae-angliae* extended into Pennsylvania. Rhodora. **19**:96-100. 1917.
14. History of the American record of *Scirpus muconatus*. Rhodora. **20**:41-48. 1918.
15. *Eragrostis peregrina* a frequent plant about Philadelphia. Rhodora. **20**:173-180. 1918.
16. *Jasione montana* a conspicuous weed near Lakewood, New Jersey. Rhodora. **21**:105-108. 1919.
17. The specific characters of *Eragrostis peregrina* and its two allies. Rhodora. **21**:133-141. 1919.
18. Notes on the American occurrence of *Crepis biennis*. Rhodora. **21**:209-214. 1919.
19. Regarding *Gentiana Andrewsii* in the coastal plain of New Jersey. Rhodora. **22**:104-110. 1920.
20. A further note on *Crepis biennis*. Rhodora. **22**:192, 193. 1920.
21. A station for *Croton glandulosus* in New Jersey. Rhodora. **23**:221-223. 1921.
22. *Muscari comosum* a new introduction found in Philadelphia. Rhodora. **24**:16-20. 1922.
23. Naturalized occurrence of *Prunus Padus* in America. Rhodora. **25**:169-177. 1923.
24. Some changes in the aspect of the list of the Philadelphia flora. Bartonia. **8**:12-32. 1924.
25. Some noteworthy indigenous species new to the Philadelphia area. Bartonia. **10**:30-52. 1929.

PLANTS NAMED FOR BAYARD LONG

Scirpus Longii Fernald, Rhodora **13**:6-8. 1911.
Cardamine Longii Fernald, Rhodora **19**:91. 1917.
Carex Longii Mackenzie, Bull. Torrey Bot. Club **29**:373. 1923.
Braya Longii Fernald, Rhodora **28**:202. 1926.
Antennaria Longii Fernald, Rhodora **28**:237. 1926 (1927).
Bryum Longii E. B. Bartram, Rhodora **30**:6, 7. 1928.
Taraxacum Longii Fernald, Rhodora **35**:379. 1933.
Hypoxis Longii Fernald, Rhodora **37**:410-413. 1935.
Antennaria Bayardi Fernald, Rhodora **38**:402. 1936.
Lycopus americanus Muhl., var. *Longii* Benner, Bartonia **16**:46. 1934 (1935).
Malaxis Bayardi Fernald, Rhodora **38**:402. 1936.
Juncus Longii Fernald, Rhodora **39**:397. 1937.
Chrysopsis Longii Fernald, Rhodora **40**:467. 1938.
Rubus Longii Fernald, Rhodora **40**:434. 1938.
Lilium Catesbaei var. *Longii* Fernald, Rhodora **42**:443. 1940.
Acer floridanum var. *Longii* Fernald, Rhodora **44**:426-428. 1942.
Carex Bayardi Fernald, Rhodora **44**:71. 1942.
Acer barbatum var. *Longii* Fernald, Rhodora **47**:160. 1945.
Xyris Bayardi Fernald, Rhodora **48**:56. 1946.
Polemonium Longii Fernald, Rhodora **51**:77. 1949.

In the preparation of this account I have been greatly assisted by Dr. E. T. Wherry and Mrs. Nellie Erisman. I would also like to express appreciation to Mr. Hans Wilkens and Mrs. Mary Domville for assistance in coordinating the list of plants named for Mr. Long.

Editor's Note

The annual report of the President of the Academy of Natural Sciences, published in Frontiers, Volume 34, No. 5, includes the following:

The largest single benefaction during the year came under the will of Bayard Long, a distinguished field botanist, who died in June after more than 50 years of devoted work in building up and curating the Academy's herbarium. He left about $400,000 for the care of this herbarium and other related programs. In his memory, we have established the Bayard Long Chair of Botany and have appointed Dr. A. E. Schuyler as the first incumbent.

Bayard Long — An Appreciation

ALFRED E. SCHUYLER
Department of Botany
Academy of Natural Sciences of Philadelphia

I first met Mr. Long in the spring of 1959 during a brief visit to the herbarium of the Academy of Natural Sciences while I was a graduate student at The University of Michigan. My purpose was to examine specimens of *Scirpus longii,* a sedge species with a restricted distribution which occurs more abundantly in the New Jersey Pine Barrens than anywhere else. Some of our conversation dealt with the mysterious sporadic collections of *S. longii* in New Jersey. On an August evening of the same year, I called him at home and expressed my desire to locate plants of *S. longii* in the field. He indicated that I had a difficult, nearly hopeless, task but said that Frank and Bob Hirst, amateur botanists in Pleasantville, New Jersey, could help me if anyone could. As it turned out, they directed me to a large stand of *S. longii,* which I mistook for *S. cyperinus,* and I was able to get numerous vegetative plants for cultivation at The University of Michigan Botanical Gardens. Because these plants did not have flowering culms, I did not realize they were *S. longii* — nor did I think they were — until they flowered in the greenhouse the following year. It was a nice surprise.

In early 1962, I wrote to Mr. Long and inquired about a position in botany at the Academy of Natural Sciences. Shortly afterwards, I received an invitation from Dr. H. Radclyffe Roberts, the director, to visit the Academy. Subsequently I was given the appointment of Assistant Curator and Chairman of the Botany Department. However, when I started work at the Academy in September, 1962, Mr. Long's health had caused him to remain at his home in Elkins Park.

I visited Mr. Long at his home a few times between 1962 and 1969. Our conversations mostly involved collections for the Academy's local herbarium and my work with the taxonomy of *Scirpus.* He expressed interest in my specialized research with species growing in eastern North America, probably due to his interest in any taxonomic problem involving the flora of this region. My remarks about *S. flaccidifolius,* plants of which he and Professor Fernald discovered in southeastern Virginia a few decades ago, and my investigation of *S. atrovirens, S. georgianus,* and *S. hattorianus,* greatly aided by the extensive collections in the local herbarium, caught his attention. Such an interest in the botanical endeavor of others undoubtedly gained him the respect of numerous plant taxonomists.

Mr. Long has left the world a botanical treasure — namely the fine collections assembled in the local herbarium of the Academy of Natural Sciences. For over 50 years, he carefully worked with this collection of plants and made it what it is today: an extremely valuable source of taxonomic information about plants growing in southeastern Pennsylvania, southern New Jersey, northeastern Maryland, and northern Delaware. Botanists can go to these collections with the assurance that there is a thorough representation of the native and naturalized plants of this area, that specimens are properly identified, and that specimens and associated data are of high quality. The local herbarium is a valuable source of data for monographers working with plants which occur in the Philadelphia area. Ecologists, as well as taxonomists, consult the collections with reference to the unusual flora of the New Jersey Pine Barrens. People in many walks of life appreciate the collections as an aid in plant identification. In short, Mr. Long's work has benefited many botanists in many ways for many years and will continue to do so.

Mr. Long left most of his estate to the Academy. This generous contribution is primarily for the care and maintenance of the local herbarium. It will enable the Academy to continue the fine efforts to which he devoted a major portion of his life.

Bayard Long The Curator

ROBERT L. SCHAEFFER, JR.
Department of Biology, Muhlenberg College

As a freshman at Haverford College, it was my good fortune to elect Howard Henry's stimulating course in botany; and it was Howard who introduced me to the botanical department of the Academy of Natural Sciences of Philadelphia. While attending college and later graduate school at the University of Pennsylvania, a generation of kind, dedicated, and stimulating floristic botanists became my associates. We were drawn together because of mutual interests. Walter Benner, John M. Fogg, Jr., Bayard Long, Francis W. Pennell, Harold W. Pretz, Walter Steckbeck, Robert Tatnall, and Edgar T. Wherry constituted this group. Some were professional botanists, but others had no formal scientific education. In spite of the fact that their backgrounds varied, all pursued their botanical endeavors with vigor. From this group, Harold Pretz and Bayard Long followed floristic studies which were closely allied to my own work. As a consequence we became lifelong friends.

While attending school near Philadelphia, much of my time was spent in the Herbarium of the Philadelphia Botanical Club, and it was here that I learned to know Mr. Long. Becoming acquainted with him was a slow process for he was quiet, reticent, and retiring. At this moment it is impossible to remember our first meeting; but in time he became as fine a friend as one could ever have.

Because Bayard was financially independent, he was able to spend his life as he chose. Very early in his career, he decided to devote his time and energy to the study of our local plants. When Mr. Long was not in the field, he was in the herbarium. Between ten and eleven A.M., he would quietly appear at his office on the top floor. Some of his colleagues did not approve of this rather late appearance. They did not realize that Bayard did not take breaks for lunch and coffee. Between one and two P.M., water was heated for a cup of tea which he consumed while continuing his work. Invariably he was the last one to leave the herbarium.

Most of us did not feel free to visit his office. We learned that it was more appropriate to corner him on one of his frequent trips to the herbarium. Even his colleague Francis W. Pennell rarely entered the office; but his good friend Walter Benner was one of the few individuals who had ready access to his work room, where Bayard spent many hours on time consuming tasks. Every specimen was thoroughly cleaned before it was arranged with great care on the herbarium paper. The individuals who did the mounting were carefully supervised. Often Bayard mounted the more difficult specimens. Fortunately for the last thirty years he had the assistance of Nellie Erisman, who very early became devoted to her work and won his confidence. Because Mr. Long did not find these menial tasks tiring, he was able to develop the superb Local Herbarium which we have today.

One soon learned that our curator was a very methodical individual. Thursday and Sunday of each week were reserved for field trips. Only the most inclement weather would keep him indoors. As the growing season advanced he was busy taking care of his full presses. Winter months were spent searching for plants with rosettes. It was his goal to have specimens in the herbarium which would show the condition of each species as it appeared at any season of the year. On the day following a trip, you would find him at the Academy enthusiastically checking the plants found on his latest field trip.

It soon became evident that "idle chatter" did not interest Bayard. When certain noisy characters appeared at the herbarium, he would retreat to the privacy of his office. Gossip either annoyed him or amused him. However, a "powwow" concerning a difficult species was another matter, for he was always ready to try to help solve troublesome problems.

Our Local Herbarium contains many of Mr. Long's fine specimens. His collecting numbers approached 90,000. In spite of the many hours placed on his own plants, he was happy to check those given to the club by other collectors. Sometimes some of these gift herbaria were put aside indefinitely. In such cases, the specimens often needed very special care. When Bayard had "the pep" to tackle one of these difficult collections he would do a masterful piece of work. The Otway Brown collection was an excellent example of what Bayard could do when the spirit moved him. Some have criticized Mr. Long because he acquired herbaria which never received his attention. His intentions were good, but his efforts were always diverted to the plants of the living collectors. Anyone willing to contribute good specimens was asked to collect for the club, and Mr. Long had contacts with most of our local field botanists. For many years Harold W. Pretz and I sent all of our local numbers to Philadelphia. Bayard was always delighted to obtain specimens from the northern corners of the local area. In fact, most of the Lehigh and Northampton botanists sent their herbaria to the Academy. Charles C. Bachman, Daniel Hamm, Charles Lochman, and Eugene Rau deposited their phanerograms in our Local Herbarium.

Mr. Long insisted that we name our plants. Even difficult hawthorns or erudite sedges were not to be sent to him without a name. Sometimes he did not agree with our identifications for he could detect the unusual. Each season he requested our latest collections. Often our annual contributions consisted of several thousand numbers. By the end of the season the job of selecting those plants he desired for the club was completed.

During the Second World War when I was in the United States Navy, Harold Pretz and Bayard Long frequently sent me letters. For two years my duty was situated at stations where it was impossible to do any botanizing. Their letters were tonics for a starving botanist. While stationed at Portsmouth Hospital, a number of weeds appeared on the hospital grounds. Fragments of these plants were sent to Philadelphia, and they were identified as unusual European species. It was impossible to resist these plants, and soon my press arrived from Allentown. For several weeks it was necessary to hide the press in the shrubbery when the weekly inspection was taking place; but one day a surprise locker inspection prevented the concealment of the press before the inspecting officer reached my locker. Much to my horror, the lieutenant spied the press. He shouted, "What's that?" I replied, "A plant press." The man was completely baffled and never could comprehend the use of a plant press. He insisted that it was a pants press, that pants were pressed in the strange piece of apparatus; and when he saw a root protruding from one side, he ordered me to get rid of the contraption. He assigned me to extra duty which consisted of cleaning solidified soap from shower stalls by means of steel wool. The dried specimens were sent to Philadelphia. The press was returned to Allentown; and in order to avoid similar situations, no more specimens were collected. Upon being discharged from the Navy, it was my good fortune to return to Philadelphia in order to complete my graduate work. During this two year period, it was possible to renew acquaintances with my friends Francis Pennell and Bayard Long.

Not all of Mr. Long's time was spent on curatorial matters. Each season in addition to his floristic studies, he would tackle a genus or a family. One year it might be our local *Cruciferae*. Another season you would find him studying *Solidago*. Often he investigated plant groups in conjunction with M. L. Fernald. Bayard was constantly checking something for "the Chief," for Fernald leaned heavily on Mr. Long's knowledge and judgment. Often Fernald was swayed by his field companion's views; but frequently he held to his own opinions. The treatment of *Rubus* disturbed Mr. Long a great deal. He found the monograph difficult, erudite, and impractical. In any case much of Long's thinking is reflected in Fernald's writings.

Many times his peers criticized Long because he did very little in the way of publication. During the early years of his career he prepared several good papers for botanical journals. Years ago he told me in confidence that he made up his mind to cooperate with Fernald rather than compete with him. Because of this decision, the Fernald and Long coalition produced many important botanical discoveries and decisions. When Fernald was ready to leave for a collecting trip, Bayard would drop everything and depart with much enthusiasm. When he returned, he was always on top of the world; but immediately his drive was diverted back to his usual routine.

His specimens received the best care. Driers were changed frequently. Fleshy plants and those which disarticulated easily were treated with chemicals. Fibrous roots were freed from dirt as he changed driers. Delicate flowers were placed between waxed paper or were covered with cotton wads. His collecting sheets contained copious information including many field notes concerning characteristics impossible to determine from dried specimens. Because he was a perfectionist his standards were high. Those of us who did not come up to his level received critical advice and sometimes caustic remarks. His words could sting, but he was always just and usually right.

Walter Benner and John M. Fogg, Jr. often accompanied Mr. Long in the field. In spite of my close association with Bayard, I knew him only as a curator. We were together only on one collecting trip. Shortly after the outbreak of the last war, Carroll E. Wood, Mr. Long and I visited a large land-fill area at Upper Darby. This trip was a wonderful experience. Unfortunately another opportunity to be with him in the field never materialized.

While he was in good health, Long visited all of our local counties. Through the years Hunterdon, Montgomery, and Bucks received his special care, and the floristic work done in these areas was outstanding. Because of the proximity of his field work to Lehigh, Northampton, and Warren we were constantly corresponding. Often two letters a week passed through the mails. Mr. Pretz and I were continually looking forward to Bayard's next letter.

After his second operation, it was no longer possible for Long to venture far from home. The Academy was out of his range, and he was not able to visit the office. The situation was accepted with reluctance but not complaint. Still his love for plants never ceased. Lawn weeds and adventives filled his press. His weekly envelopes often contained fragments of a rare weed or a cultivar which he discovered on one of his many walks near his home. Mr. Pretz and I corresponded with him until the day he was admitted to the hospital for the last time.

Throughout his life he obtained much enjoyment from his garden and woods. Somehow we never had the opportunity of visiting his home at Elkins Park, and the house was never described in his letters. However, the plants about the house were vividly portrayed. The displays of *Eranthis, Galanthus, Iris, Mertensia, Scilla,* and *Trillium* must have been outstanding. In addition to his garden, his stamp collection gave him much pleasure; and he constantly visited local libraries for good books. Mr. Long was surely an introvert, but his interests were more diversified than some realized.

Some years ago I overheard a colleague talking to Walter Benner about Mr. Long. This individual was not able to comprehend how Bayard could possibly enjoy the life he led. Benner had the answer and he replied: "This is Mr. Long's way of life." Bayard enjoyed his life and pursued his interests to the very end.

The Effect of Urban Conditions on the Trees in the Vicinity of Logan Circle

LUDWIG KOELNEAU (*Deceased*)

The suggestion has been made that the exceedingly dry summer of 1968 did not seriously injure the trees in and about Philadelphia — at least not very much anyhow. This may be, and probably is, true out in the suburbs or even in the city where the trees have grown on the original soil structure and buildings do not cover the surrounding space. But in downtown sections and along the Benjamin Franklin Parkway, an artificial geologic condition has been created. It is the perched watertable. The following has been written to show what a hard time trees can have trying to live in a human environment.

Two drawings have been made, one a map of the area discussed showing where to find the examples, and the other drawing to explain the perched watertable concept.

Basically, a perched watertable is a structure which prevents water from sinking to a lower level. Thus, it may be either a basin or an impervious watershed. Both types are to be found in the downtown area. An old, building-debris filled basement, a pavement or a surfaced parking lot all prevent rain from sinking to a lower level. The drawing shows a rubble-filled basement, a sidewalk and a pavement. Both a pavement and a parking lot form roofs over deserts, or waterless soil structures, while the drainage for the sidewalks runs onto the boulevard space. The water storage space is filled as shown in the drawing. The portion of the space beyond the roof structure serves as a water source to be recovered during dry spells through hydroscopic pressure.

The map is furnished as a confirmatory guide for those who care to see and check on the text. The places shown on it are by no means the only examples. There are many places where the relationship of tree growth to the subsurface is not so obvious.

Using the map as the basis of a nature trail, the number one spot is across from the telephone building on Sixteenth Street and Franklin Parkway. The fourth tree from Sixteenth Street straddles a wall. The sidewalk side of the root system goes into a filled basement where, in moist years, there is plenty of water. In 1968, there was none, and the root system died. The death streak up the trunk of the tree shows how inefficient seive cells are in laying a foundation of Cambian growth over dead inner structures. This area died in two periods; the very dry year of 1965, with only twenty-nine and a third inches of rainfall, started it, and 1968, with the smallest rainfall in this century, finished the job. It is unlikely that this tree will ever be able to heal this scar. The result is exactly the same as if an automobile or lightning had ripped the bark off.

Up the Parkway a block is the number two spot. The first three trees are either on the edge of an old foundation or else over a filled basement. All three trees are goners.

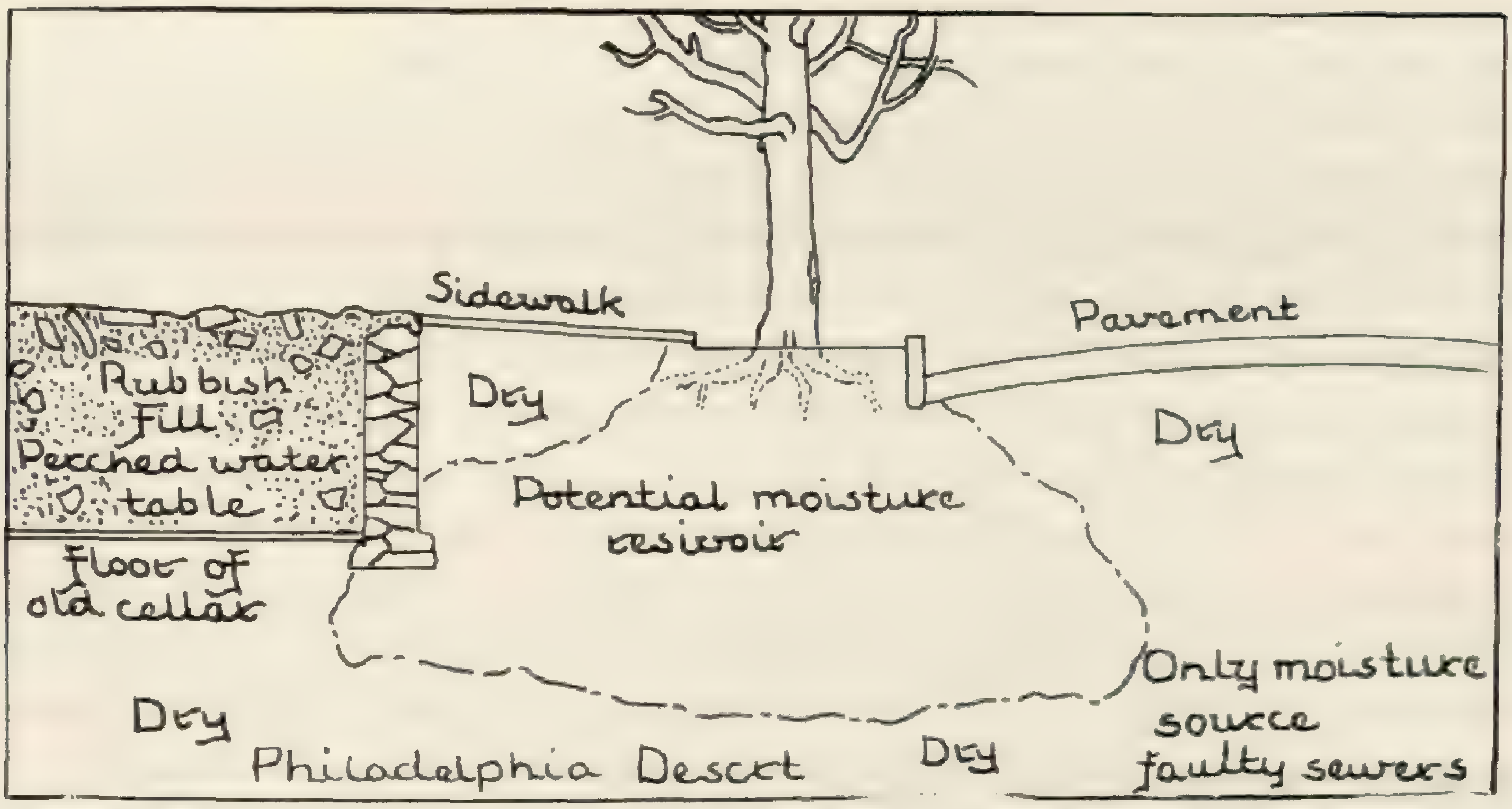

Sidewalk
Pavement
Rubbish Fill
Perched water table
Dry
Floor of old cellar
Potential moisture reservoir
Dry
Only moisture source faulty sewers
Dry
Philadelphia Desert
Dry

FIGURE 1. — Perched water table.

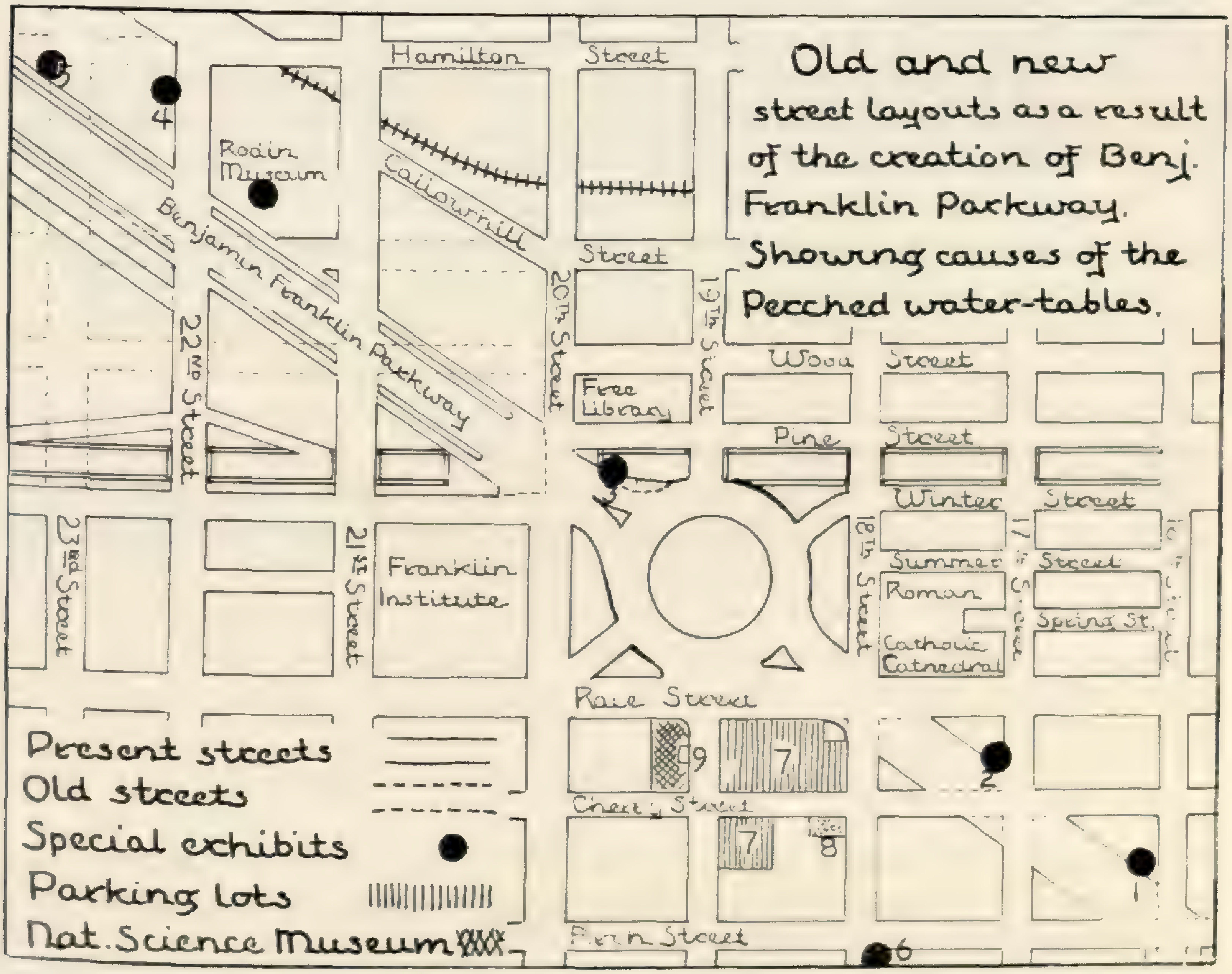

Old and new street layouts as a result of the creation of Benj. Franklin Parkway. Showing causes of the Perched water-tables.
Hamilton Street
Callowhill Street
Rodin Museum
Benjamin Franklin Parkway
22nd Street
20th Street
19th Street
Free Library
Wood Street
Pine Street
Winter Street
Summer Street
Spring St.
Roman Catholic Cathedral
18th Street
17th Street
16th Street
23rd Street
21st Street
Franklin Institute
Race Street
Cherry Street
Arch Street
1
2
3
4
5
6
7
7
8
9
Present streets
Old streets
Special exhibits
Parking lots
Nat. Science Museum

FIGURE 2. — Map showing locations of trees discussed in text.

Number three is on Logan Circle. The root system of this tree was injured some years back by the Freeway excavation. It had almost recovered, but now the space within the dashed line has been paved. The days of this tree are numbered, too.

Number five is dead. One little adventitious sprout, three feet high growing just above the ground, is all the root-structure can water.

Number four is something of a novelty. It is attempting to grow on a slightly buried wall and over one of the basement perched watertables. But whereas the other trees near the curb or sidewalk are the victims of man through automobiles, this tree is a victim of the God named Football as well as automobiles, but sort of second hand. For years, the area between Twenty-Second Street and Twenty-Fourth Street has been an unofficial football field. Four years ago this tree was planted here and well-guarded with posts and wire screen. The next year Fairmount Park directors decided to sanction football on this lawn space, and to be very fair to our national game of baseball, a diamond was more or less laid out. A pass is likely to happen at any time in the progress of a game, and the receiver may be too close to Twenty-Second Street. He thinks of his life and he thinks of the ball in reference to Twenty-Second Street automobiles, and chooses life, his own. He grabs onto the tree as a momentum stop.

This tree was about an inch in diameter when planted. It is now about three inches thick, and the field side of the tree is dead. About a foot from the tree is a yearly recurrent crack. The tree side of this crack is between three and four inches higher than the field side. All root growth on the field side has been stopped. The tree leans toward Twenty-Second Street at an angle of thirty degrees.

The spot at the Rodin Museum indicates a pin oak just outside the hedge at the southeast corner of the court. Black oaks have coarse, thick bark, while the bark on the white oaks is thinner. Lightning effects each bark type differently, and the extent of damage also depends on the time of the stroke in reference to rainfall. A white oak injury is several inches to a foot or more wide. If the rain has fallen so that the bark is wet, the electricity of the stroke follows the outside of the tree; on a black oak, however, if the tree is struck at the beginning of the storm, the juice finds entrance into the sapwood. This tree was struck at the beginning of the storm in a year when the cambium was hardly growing. There was sufficient moisture in the wood three and four years back to form a good track for the lightning. Three years of sapwood, the cambium and the bark were exploded off the tree.

In thought I now return to perched watertables. Number 6 is at the Arch Street Presbyterian Church. Five trees were planted there in two-foot holes in the sidewalk. The water is no closer than two blocks. The soil structure here is a series of ancient, or at least Pleistocene, stream beds, and sands largely of marine invasions between glacial episodes. The new Uris construction at Seventeenth and Market has gone down over forty feet through this deltic structure and has had no trouble with seepage. The earth is bone dry to bedrock. To a person botanically inclined, this is the funniest place in Philadelphia. How could anyone expect trees of our type to grow in an environment dryer than the deserts of Libya or Atacama? They haven't! Four of the trees have been broken off by automobiles. One is still there, but I have not examined its buds. One has been replaced by some wag with a year's growth of an *Ailainthus*. It is more than worth a visit to this place just to see the lack of thought in people. The Calvinist doctrine emphasizes predestination. It is more than obvious that the doctrine has lived up to its potential in this instance. Everything was against the growth of these trees.

Both numbers 7 are paved parking lots, perched watertables while it is raining and roofs for deserts then and at all other times.

Number 8 is a building "raised to level." This is the technical expression for demolition contracts. The supposition is that buildings require excavation for basements before they are built; consequently, when structures are torn down, the debris of the building goes into its basement and additional fill is added if necessary to be in accord with the local street level. All of the park space on both sides of the Benjamin Franklin Parkway from Logan Circle up to the Fairmount Museum is of this character. A little additional dirt was put on top of the mass in which to grow grass and plant trees. Twenty years ago the trees along this street were about five inches in diameter. Each one had a cross leaning against it with the name of a veteran who had been killed in the Second World War. Most of this soil has now washed off, there is no grass there anymore, and the wreckage of old homes is present most everywhere.

Now and at last number 9. This is that little place on the east side of the Natural History Museum where the two Ginkos are growing, the only place in that block where the water from rain can touch the ground except for a four foot wide strip west of the Moore Institute.

Book Review

The Flora of Ulster County, New York by Mary Domville and Henry F. Dunbar [1]

Edgar T. Wherry

University of Pennsylvania

Ulster County is in southeastern New York, of varied terrain from the Hudson River lowland to Catskill peaks up to nearly 2300 feet altitude just below latitude 42°. As a result of extended field and herbarium study, 1678 species of vascular plants are recognized, their 135 families being arranged in standard manual sequence, but the genera and species alphabetically, making them easy to locate. The nomenclature largely follows Fernald (1950) and Gleason (1952), but recently proposed revisions have been taken into account. (Some of these seem justifiable, but one can not but wonder what is gained by, for instance, reducing *Anemonella* to just another *Thalictrum,* all the *Dentarias* to *Cardamines,* or *Isanthus* to *Trichostema*). A few significant modern changes did get missed, notably the identity of *Viola "papilionacea"* and *V. sororia;* the real difference between the European *Myriophyllum spicatum*, now a vicious weed in this country, and the well-behaved native *M. exalbescens*; and the need to replace the confused Linnean name *Gerardia* by *Agalinis.*

For each taxon there is a traditional colloquial name, a useful characterization of the habitat, and a mention of the blooming period. The reviewer does feel it regrettable that those taxa which are recognizably introduced are not emphasized by some special type-face or symbol, since such information may be important to, *e.g.,* wild-flower gardeners, to warn them against bringing in potentially aggressive invaders, workers on problems of weed-control, plant-geographers, and so on. On the whole, however, this constitutes a superior local flora. — E. T. W.

---

[1] John Burroughs Natural History Society Bulletin 8, 136 pages, paper-back; Mohonk Lake, New Paltz, New York 12561. $2.50.

Philadelphia Botanical Club Records, 1969

Officers and Members, 1969

Dr. Edgar T. Wherry, *Honorary President*

Dr. Ralph M. Sargent, *President*
Dr. Alfred E. Schuyler, *Vice President*
Miss Julia E. Moore, *Secretary*

William L. Freyburger, *Treasurer*
Bayard Long, *Curator*
Dr. Edgar T. Wherry, *Editor*

active members (as of December 31, 1969)

	Elected
Mrs. C. J. Allen, Jr., Woodside Lane, Riverton, N.J. 08077	1957
Dr. Walter M. Benner, 5636 Loretta Ave., Philadelphia, Pa. 19124	1912
Miss E. Marie Boyle, 1521 Norman Rd., Havertown, Pa. 19083	1965
Mrs. Robert A. Bradel, Braddocks Mill Lake, R. D. 2, Marlton, N. J. 08053	1963
William C. Brumbach, 850-D Berkshire Drive, Reading, Pa. 19601	1943
Richard B. Chillas, Arden Hall Nursing Home, 7141 McCallum St., Philadelphia, Pa. 19119	1942
Dr. Donald W. Crittenden, 21 Temple Ave., Sellersville, Pa. 18960	1966
Miss Phoebe Crosby, Joseph Priestley House, 224 W. Tulpehocken St., Phila., Pa. 19144	1966
W. L. Dix, Methodist Church Home, 70 Stockton Ave., Ocean Grove, N.J. 07756	1942
Albert Donaghy, Jr., R.D. 1, Pottstown, Pa. 19464	1952
Dr. Francis Drouet, Academy of Natural Sciences, Philadelphia, Pa. 19103	1961
Miss Elizabeth C. Earle, 132 Carlton Place, Media, Pa. 19063	1935
Mrs. Mark F. Emerson, Evans Rd. at Sumneytown Pike, Gwynedd Valley, Pa. 19437	1964
Mrs. Nellie A. Erisman, 218 W. Abbottsford Ave., Philadelphia, Pa. 19144	1945
Mrs. W. Brooks Evert, 115 N. Lakeside Dr. E., Birchwood Lakes, Medford, N.J. 08055	1957
Carl W. Fenninger, 8304 Stenton Ave., Philadelphia, Pa. 19118	1947
Miss Elizabeth H. Flavell, 69 S. College Ave., Flourtown, Pa. 19031	1946
Dr. John M. Fogg, Jr., 6807 Quincy St., Philadelphia, Pa. 19119	1921
Mrs. John M. Fogg, Jr., 6807 Quincy St., Philadelphia, Pa. 19119	1961
Wiliam L. Freyburger, 734 Homestead Ave., Havertown, Pa. 19083	1956
Mrs. William L. Freyburger, 734 Homestead Ave., Havertown, Pa. 19083	1956
Miss Julia W. Frick, 275 North Latch's Lane, Merion Station, Pa. 19066	1963
Mrs. Allan O. Geertz, The Cambridge, 1201, Philadelphia, Pa. 19144	1969
Dr. Norma Good, 745 Redman Ave., Haddonfield, N. J. 08033	1968
Dr. Ralph E. Good, Dept. of Biology, Rutgers University, 3rd. and Wilson, Camden, N. J. 08102	1968
Dr. Robert B. Gordon, 415 Sharpless St., West Chester, Pa. 19380	1942
Mrs. Robert B. Gordon, 415 Sharpless St., West Chester, Pa. 19380	1962
John F. Gyer, Jessup Mill Rd., Clarksboro, N.J. 08510	1960
Louis E. Hand, Box 146, New Lisbon, N.J. 08064	1936
Dr. J. Zern Heberling, 206 Market St., Bangor, Pa. 18013	1966
Dr. Stevens Heckscher, Dept. of Mathematics, Swarthmore College, Swarthmore, Pa. 19081	1966
Miss Josephine de N. Henry, Gladwyne, Pa. 19035	1938
J. Norman Henry, Jr., 410 Mulberry Lane, Haverford, Pa. 19041	1956
R. L. Hill, Jr., 180 Drexel Ave., Lansdowne, Pa. 19050	1963
Mrs. R. L. Hill, Jr., 180 Drexel Ave., Lansdowne, Pa. 19050	1963
Frank Hochgesang, 422 Edgemoor Drive, Moorestown, N.J. 08057	1966
Mrs. Frank Hochgesang, 422 Edgemoor Drive, Moorestown, N. J. 08057	1966
Mrs. John M. Huebner, 150 Anton Rd., Wynnewood, Pa. 19096	1958
Mrs. W. E. Hunt, 222 Kent Rd., Ardmore, Pa. 19003	1968
Donald Iffland, 115 Grandview Rd., Ardmore, Pa. 19003	1964
Mrs. Lawrence E. Jewett, Howell Rd., RD 1, Malvern, Pa. 19355	1966
Mrs. M. L. Kendig, 65 S. Main St., Manheim, Pa. 17545	1935

Miss Natalie B. Kimber, 538 E. Locust Ave., Philadelphia, Pa. 19144 ... 1928
Mrs. William Klauser, 311 Zeralda St., Philadelphia, Pa. 19144 ... 1969
Ludwig A. Koelnau, 850 N. 22nd St., Philadelphia, Pa. 19103 (Deceased 4-12-70) ... 1952
Mrs. Ida K. Langman, 248 Harvey St., Philadelphia, Pa. 19144 ... 1937
Mr. Philip A. Livingston, Livingston Publishing Co., 18 Hampstead Circle, Wynnewood, Pa. 19096 ... 1969
Dr. Hui-Lin Li, Morris Arboretum, Philadelphia, Pa. 19118 ... 1944
Mrs. Baldwin Lucké, 630 Rose Lane, Bryn Mawr, Pa. 19010 ... 1965
Mrs. C. P. Mann, 905 Cherry Lane, Riverton, N.J. 08077 ... 1957
Dr. Ara H. derMarderosian, Phila. College of Pharmacy & Science, 43rd & Kingsessing, Philadelphia, Pa. 19104 ... 1969
Sidney Margolis, Park Drive Manor, Apt. 703 B, Lincoln Dr. & Harvey St., Philadelphia, Pa. 19144 ... 1962
Mrs. Alfred Martin, Orchard Lane, Three Tuns, Ambler, Pa. 19002 (Resigned 1-1-70) ... 1961
Dr. Jack McCormick, 1005 Millbrook Rd., Newtown Square, Pa. 19073 ... 1966
Mrs. Charles J. McKinney, 233 Rex Ave., Philadelphia, Pa. 19118 ... 1961
Dr. Tilford D. Miller, 215 King Ave., Westmont, N.J. 08108 ... 1962
Mrs. Tilford D. Miller, 215 King Ave., Westmont, N. J. 08108 ... 1962
Miss Julia E. Moore, Mill Creek Rd., Chalfont, Pa. 18914 ... 1963
Dr. Edwin T. Moul, Dept. of Botany, Rutgers University, New Brunswick, N. J. 08903 (Resigned 1-1-70) ... 1945
A. Edward Murray, Jr., 70 Kraft Lane, Kenwood, Levittown, Pa. 19053 ... 1960
Mrs. Edward Norman, 22 Pin Oak Drive, Trenton, N.J. 08638 ... 1961
Miss Elizabeth Orsatti, 439 Houston Rd., Ambler, Pa. 19002 ... 1962
Dr. William Overlease, Mill Rd., Box 144, R.D. 1, West Chester, Pa. 19380 ... 1964
Mrs. Frank Parker, 402 S. 45th St., Philadelphia, Pa. 19104 ... 1950
Dr. Ruth Patrick, P.O. Box 4095, Chestnut Hill Station, Philadelphia, Pa. 19118 ... 1937
Mrs. Richard Philson, 321 Blaine Ave., West Berlin, N.J. 08091 ... 1964
Harold W. Pretz, 123 S. 17th St., Allentown, Pa. 18104 ... 1909
Dr. Charles W. Reimer, 856 Cricket Rd., Secane, Pa. 19018 ... 1953
Dr. Robert Robbins, Temple University, Dept. of Radiology, Philadelphia, Pa. 19140 1954
Dr. Robert Robertson, 125 W. Spruce St., Moorestown, N.J. 08057 ... 1960
Mrs. Robert Robertson, 125 W. Spruce St., Moorestown, N.J. 08057 ... 1960
Mrs. Karl Rugart, 612 Bryn Mawr Ave., Penn Valley, Narberth, Pa. 19072 ... 1942
Dr. Ralph M. Sargent, 520 Panmure Rd., Haverford, Pa. 19041 ... 1948
Mrs. Ralph M. Sargent, 520 Panmure Rd., Haverford, Pa. 19041 ... 1962
Dr. Robert L. Schaeffer, Jr., 30 N. 8th St., Allentown, Pa. 18101 ... 1938
Dr. Alfred E. Schuyler, Academy of Natural Sciences, Philadelphia, Pa. 19103 ... 1962
Miss Dorothy Scott, 2359 E. Cumberland St., Philadelphia, Pa. 19125 ... 1959
John Scott, Crestview Drive, Springfield, Pa. 19064 ... 1968
Mrs. George R. Shaefer, 2976 Dorman Ave., Broomall, Pa. 19008 ... 1963
Mr. William E. Shull, Jr., 1105 Salem Ave., Burlington, N. J. 08016 ... 1969
Mrs. William E. Shull, Jr., 1105 Salem Ave., Burlington, N. J. 08016 ... 1969
Henry Singer, Valley Hill Farm, Valley Forge, Pa. 19481 ... 1963
William Sipple, 918 Clements Bridge Rd., Runnemede, N.J. 08078 ... 1966
Dr. Robert Speck, 737 Cedar Ave., Haddonfield, N.J. 08033 ... 1964
James R. Steel, Jr., 1503 Shoemaker Rd., Abington, Pa. 19001 ... 1961
Dr. C. I. Stiteler, 901 E. 20th St., Chester, Pa. 19013 ... 1945
Miss Mary Sullivan, Montgomery Court L 23, Narberth, Pa. 19072 ... 1954
Mrs. Edmond G. Thomas, 10 Norman Lane, Philadelphia, Pa. 19118 ... 1963
Miss Elizabeth Thorp, 403 S. 41st St., Philadelphia, Pa. 19104 ... 1953
Mrs. J. H. Vance, 148 Montgomery Ave., Bala-Cynwyd, Pa. 19004 ... 1950
Jesse T. Vogdes, N. Lemon St., Media, Pa. 19063 ... 1960
Mrs. Jesse T. Vogdes, N. Lemon St., Media, Pa. 19063 ... 1958
Dr. Paul R. Wagner, 789 Main St., Collegeville, Pa. 19426 ... 1935
E. Perot Walker, 3009 Park Rd., Lafayette Hill, Pa. 19444 ... 1939
Mrs. E. Perot Walker, 3009 Park Rd., Lafayette Hill, Pa. 19444 ... 1958
Albert J. Webb, 351 Oak Terrace, Wayne, Pa. 19087 ... 1959
Dr. Lily A. Weierbach, 5220 Wayne Ave., Philadelphia, Pa. 19144 ... 1958
Dr. Edgar T. Wherry, 41 W. Allens Lane, Philadelphia, Pa. 19119 ... 1925
Hans Wilkens, 424 S. 15th St., Reading, Pa. 19602 ... 1928
David L. Williams, River Rd., Box 255 C, R.D. 1, Belle Mead, N. J. 08502 ... 1963
John Wolf, 44 High St., Sharon Hill, Pa. 19079 ... 1966

MRS. JAMES B. WOODFORD, Cedar Run Lake, Marlton, N.J. 08053	1959
MRS. H. WINFIELD WRIGHT, 515 Folcroft Ave., Folcroft, Pa. 19032	1959

CORRESPONDING MEMBERS

DR. DAVID BERKHEIMER, 13833 N. 107th Drive, Sun City, Arizona 85351	1943
MRS. DOROTHY GRAHAM, Box 134, Georgetown, Md. 21930	1964
DR. THEODOR P. HAAS, Islander Hotel, 400 Seaside Ave., Waikiki, Honolulu, Hawaii 96815	1946
CHARLES E. MOHR, Box 3900, Greenville, Del. 19807	1959
MRS. E. D. RUDOLPH, Dept. of Botany and Plant Pathology, Ohio State University, 1735 Neil Ave., Columbus. Ohio 43210	1961
DR. HAROLD ST. JOHN, Bishop Museum, Honolulu, Hawaii 96819	1927
DR. WILLIAM RANDOLPH TAYLOR, University of Michigan, Ann Arbor, Mich. 48104	1921
DR. HEBER W. YOUNGKEN, 17 Cox Rd., Winchester, Mass. 01890	1918

DECEASED

MRS. ALAN CRAWFORD	
MRS. HAROLD EVANS	
BAYARD LONG	June 9, 1969
CHARLES H. VAN HOUSEN	November 28, 1968

Program of Meetings

Date		Subject	Speaker	Attendance
Jan.	23	Natural History Survey of The West Coast of The United States	John D. Scott	22
Feb.	27	Exploring for Orchids in Mexico	Dr. Wilbur Zimmerman	23
Mar.	27	The Index Nominum Genericorum Project	Mrs. Ida K. Langman	20
Apr.	24	The Arboretum: Its Role in Modern Life	Dr. A. Orville Dahl	26
May	22	Conservation: Pollution and Mosquitoes or What's Happening in Suburbia	Mrs. C. J. Allen	26
Sept.	25	Reports by Members on Summer Activities		23
Oct.	23	No Rolling Stone, A Look at Mosses	Mrs. Robert Robertson	30
Nov.	20	The Ericaceae: With Illustrations of The Genera of The Eastern United States	Mr. Philip A. Livingston	25
Dec.	18	A Botanist in Japan and Taiwan, with an added glimpse of Hawaii	Dr. John M. Fogg, Jr.	35

Trips

Date		Locality	Leaders	Attendance
Apr.	20	Tyler Arboretum	John Wolf	12
May	4	Longwood Gardens: Rock Garden and Ericaceous Shrubs	Dr. E. T. Wherry Dr. Robert Gordon	8
Oct.	5	South Jersey, central Barrens area	Mr. and Mrs. Brooks Evert	11
Nov.	9	Study Trip for Mosses in the Moorestown area	Mrs. Robert Robertson	9

New Staff Member In Herbarium

Florence M. Givens joined the Academy staff in November, 1969. A trained botanist, presently working toward a Master's degree from the University of Georgia, Florence has been a great asset to the herbarium already. Mrs. Givens has an AAS in Biological Technology from the State University of New York at Farmingdale and a BS in Agriculture — Botany from the University of Georgia. Her past working experience includes a job as Summer Intern at the Smithsonian Institution (Botany), a position as Senior Scientific Assistant for American Cyanamid, and a job at the University of Georgia as a Research Assistant doing pollen analysis.

At the Academy, Florence is working primarily with the large backlog of Mr. Long's collections and the Local Herbarium. As Scientific Assistant to Dr. Schuyler, she is responsible for identifying the plants, inserting the material into the collection, and sending specimens on exchange to other institutions, as well as other routine herbarium activities.

Manuscripts Wanted

Manuscripts are now being accepted for the 1970 *Bartonia.* Although past issues have dealt primarily with floristic botany, any paper of local interest dealing with botany in any of its forms, including ecological plant studies, will be considered. Please send manuscripts to:

Bartonia
c/o Mrs. Barbara Jones
Academy of Natural Sciences
Nineteenth and the Parkway
Philadelphia, Pennsylvania 19103

A f 73

No. 40 **1970**

BARTONIA

JOURNAL OF THE PHILADELPHIA BOTANICAL CLUB

CONTENTS

Check-list of the Vascular Flora of Cape May County, New Jersey
OTWAY H. BROWN AND EDGAR T. WHERRY 1

Windmill Grass (*Chloris verticillata* Nuttall) in Pennsylvania
JACK McCORMICK, DAVID HARPER, LESLIE JONES AND WESLEY MURRAY 19

A New Botanist at the Academy 20

Field Trips and Program of Meetings .... *Inside Back Cover*

PUBLISHED BY THE CLUB
ACADEMY OF NATURAL SCIENCES, 19TH & PARKWAY
PHILADELPHIA, PENNSYLVANIA 19103
Subscription Price, $2.00 Back Numbers, $2.00 each.
ISSUED AUGUST 5, 1971

MISSOURI BOTANICAL
AUG 26 1971
GARDEN LIBRARY

The Philadelphia Botanical Club, 1970

Editor: ALFRED E. SCHUYLER

Managing Editor: BARBARA R. JONES

Members of the Editorial Board:

RALPH E. GOOD
JAMES C. HICKMAN
HUI-LIN LI
RONALD L. STUCKEY

Officers of the Philadelphia Botanical Club for 1971

Honorary President: EDGAR T. WHERRY
Vice President: ALFRED E. SCHUYLER
Treasurer: WILLIAM L. FREYBURGER
President: RALPH M. SARGENT
Secretary: JULIA E. MOORE
Curator: JOHN M. FOGG, JR.

The 1971 issue of BARTONIA (No. 41) will be dedicated to the memory of Dr. Walter MacKennett Benner who died December 31, 1970. Dr. Benner was a long-time member of the Philadelphia Botanical Club and a dedicated local botanist.

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

NO. 40 1970

Check-list of the Vascular Flora of Cape May County, New Jersey

Otway H. Brown and Edgar T. Wherry[1]

Introduction

Cape May County includes the southernmost part of the State of New Jersey and largely is composed of a 16 mile long peninsula between the Atlantic Ocean and Delaware Bay. Owing to many complex and poorly understood conditions related to its latitudinal position, the amelioration of its climate by the surrounding waters, and its location along the late-Pleistocene continental shelf migration corridor, the County supports a flora composed of at least 1700 taxa, including 25 species and varieties of southern affinity which have not been found elsewhere in the State. An authoritative current list of the County, therefore, will be useful to phytogeographers as well as to local naturalists.

The present list is based on a manuscript by the late Otway H. Brown entitled, "Plants of Cape May County, New Jersey, collected from 1893 to 1931." Shortly before his death in 1946, Mr. Brown submitted the manuscript to the Philadelphia Botanical Club for possible publication (Benner and Pennell, 1947). A special committee of the Club determined that the list required substantial revision to accommodate nomenclatural changes and to permit additions of taxa not included in the original.

A copy of Brown's manuscript was placed in the Library of The Academy of Natural Sciences of Philadelphia, but the project to revise the catalog remained dormant for more than 20 years. Recently, however, Professor George A. Clark, a Cape May naturalist and friend of Mr. Brown, interested Dr. Edgar T. Wherry,

---

[1] Introduction by Jack McCormick, Waterloo Mills Field Research Station, Devon, Pennsylvania.

Professor Emeritus of the University of Pennsylvania and a Research Associate of The Academy of Natural Sciences, in undertaking a revision and supplementation of the Cape May flora. In his characteristically thorough and meticulous manner, Professor Wherry examined all specimens from Cape May County that are deposited in the local herbarium of The Academy of Natural Sciences. These specimens had been authenticated by Bayard Long and by other specialists in critical groups.

In this revision, Wherry has marked all taxa found in the herbarium, but not included in Brown's list, with the abbreviation "herb." in parentheses. For taxa that have been collected only recently, and which may represent plants introduced after Brown's observations ceased, the earliest year of collection also is given within the parentheses. The names of taxa known to have been introduced to the County are enclosed in brackets. Taxa dubiously reported in Brown's list and not supported by specimens have been deleted. The sequence and nomenclature of taxa have been brought up to date, but within each family, the genera, and within them, the species, are listed in alphabetical order to facilitate use. Scientific names recognized in Gray's Manual of Botany, 8th Edition (Fernald, 1950), are listed parenthetically for most taxa entered in this list under a different epithet. Parenthetical listings of synonymies also have been included in a few other instances, even though nomenclature employed in Gray's Manual has been accepted.

Most of the annotations on abundance, habitat, and flowering periods in the original Brown manuscript have been omitted to conserve space. General habitat and abundance data are included for a few taxa that Wherry considers to be geographically or ecologically notable. Although it might have been advantageous to present exact localities for rare taxa, such information was deleted to reduce the probability of vandalism by private collectors.

Description of Cape May County

Cape May County (Latitude 39°19′28″ to 38°55′48″ North) encompasses a total of 290 square miles, of which 23.3 square miles are covered by water. Its longest boundaries are formed by the Atlantic Ocean on the east and Delaware Bay on the west. Inland, the boundary on the northwest, between Cape May and Cumberland Counties, is formed by West Creek and is continued by a line from the head of the Creek to Hunters Mill on the Tuckahoe River. From that point eastwardly to the Ocean, the northern boundary, which separates Cape May and Atlantic Counties, is the Tuckahoe River and Great Egg Harbor Bay.

Coastal Plain sediments, which range in age from Cretaceous to recent and exceed 6,000 feet in thickness, underlie the County and rest unconformably on a pre-Cambrian basement (Widmer, 1964). Except for extensive tidal marshes and narrow marginal areas of beach sand, the surface is veneered by deposits of the Cape May Formation (Pleistocene: Sangamon Epoch and later). These deposits, which are 10 feet or more thick, are composed of gravel and sand, with some clay (Gill, 1959; Lewis and Kümmel, 1950). The upland soils developed from these parent materials largely consist of "uniform sand and silty sand with some gravel scattered throughout the profile" and have excellent to very poor drainage (Minard, Holman, and Jumikis, 1954). Tedrow (1962) characterized the soils as members of a Sassafras (Cape May Phase) series.

The surface of the County is relatively low, with level to slightly undulating topography. About one-third of the area consists of tidal wetlands. The eastern edge is formed by saline tidal marshes, 2 to 3 miles wide, which are bounded on the seaward side by a sandy off-shore bar (Crawford, 1900; Fender, 1938; Harrison, 1889; Harshberger, 1900, 1902, 1903; Kindle, 1937). On the bay side, a large tidal marsh occurs along the north and northwestern borders of the County (Good, 1965). Farther south, however, the marshes are smaller and are not contiguous. A common feature of the central and southern Bay shore, as well as the offshore bar on the Atlantic coast, is the excellent development of sand dunes from 5 to 25 feet high (Atwell, 1932).

Much of the peninsular section of the County, which generally is less than 10 feet above mean sea level, is poorly drained and supports extensive stands of lowland forests (Bernard, 1963). Basins of interior drainage, similar in many respects to the Carolina Bays (Wolfe, 1953, 1956) are conspicuous topographic features. Some of these basins, notably those known as Bennett Bogs, include a number of unusual taxa (Long, 1908, 1912, 1928; Stone, 1908a, b, 1910, 1911; Stone, Leeds & Long, 1914; Brown, 1913a, b, 1914; Killip, 1919; Alexander, 1951; Wherry, 1954; Montgomery, 1963; Montgomery and Fairbrothers, 1963). Extreme elevations in this peninsular region generally are 30 feet or less above mean sea level. The maximum elevation, about 60 feet above mean sea level, occurs in the northwestern part of the County along the Tuckahoe River watershed divide.

The climate of Cape May County varies considerably from the southern peninsular section to the northern mainland part. Mean annual precipitation is 4.29 inches greater at Belleplain (44.54 in.), in the northwest, than at Cape May (40.25 in.), in the south. Mean monthly precipitation is consistently greater at Belleplain, with the largest difference (0.88 in.) during July. Throughout the County, however, the greatest amount of rain falls in July and August. The driest period occurs from September through November (U. S. Weather Bureau, 1964). Mean monthly temperatures are 0.2° to 2.4°F. higher at Belleplain than at Cape May from April through June. During the warmest month (July), the two stations have similar mean temperatures (74.1°F.). Throughout the remainder of the year, from August through May, mean monthly temperatures range from 0.5° to 3.4°F. lower at Belleplain (U. S. Weather Bureau, 1964). At Cape May, during 46 to 47 years, the highest temperature of record was 100°F. and the lowest was − 3°F. In contrast, at Belleplain, the extreme temperatures during 58 to 59 years of record were 106° and − 22°F. (U. S. Weather Bureau, 1964). The frost-free season averages 51 days longer at Cape May (218 days) than at Belleplain (167 days; U. S. Department of Agriculture, 1941).

Check-list of the Vascular Plants of Cape May County

PTERIDOPHYTES

Lycopodiaceae: *Lycopodium alopecuroides, appressum* (herb.), *carolinianum, chapmanii, flabelliforme, lucidulum, obscurum.*

Selaginellaceae: *Selaginella apoda.*

Isoetaceae: *Isoetes melanopoda,* disjunct northeastward.

Equisetaceae: *Equisetum arvense, hyemale.*

Ophioglossaceae: *Botrychium biternatum* (herb.), *dissectum, obliquum, virginianum. Ophioglossum vulgatum* "forma *arenarium,*" endemic in sand-dune hollows, type locality Wildwood.

Osmundaceae: *Osmunda cinnamomea, regalis* v. *spectabilis.*

Polypodiaceae, *sens. lat.*: *Asplenium platyneuron. Athyrium asplenioides. Dennstaedtia punctilobula. Dryopteris* × *boottii* (herb.), *carthusiana* ("*spinulosa*"), *cristata, intermedia.* [*Matteuccia pensylvanica*]. *Onoclea sensibilis. Polypodium virginianum,* one loc., on old stump. *Polystichum acrostichoides. Pteridium aquilinum* v. *latiusculum* & v. *pseudocaudatum* (herb.). *Thelypteris noveboracensis, palustris* v. *pubescens, simulata. Woodwardia* (*Lorinseria*) *areolata, Woodwardia* (*Anchistea*) *virginica.*

SPERMATOPHYTES

CONIFERS

Pinaceae, *sens. lat.*: *Chamaecyparis thyoides. Juniperus virginiana. Pinus echinata,* [*resinosa*], *rigida, serotina,* [*strobus*], [*sylvestris*], *taeda, virginiana.* [*Taxodium distichum*].

MONOCOTS, REDUCED

Typhaceae: *Typha angustifolia, glauca* (herb.), *latifolia,* typ. & f. *ambigua* (herb.).

Sparganiaceae: *Sparganium americanum, androcladum.*

Zosteraceae (Potamogetonaceae): *Potamogeton capillaceus* (herb.), *confervoides, diversifolius, epihydrus,* typ. v. & v. *nuttallii, oakesianus, pectinatus* (herb.), *pulcher, pusillus. Ruppia maritima* v. *longipes,* brackish waters. *Zostera marina* v. *stenophylla,* marine.

Alismataceae: *Alisma subcordatum. Sagittaria australis, engelmanniana, graminea, latifolia, subulata, teres.*

Hydrocharitaceae: [*Egeria densa*]. *Vallisneria americana,* rare.

MONOCOTS: GRASSES

Gramineae: [*Agropyron repens*]. *Agrostis* [*alba*], *altissima,* [*canina*], *hyemalis, palustris, perennans,* [*tenuis*]. [*Aira caryophyllaea*], [*praecox*]. [*Alopecurus myosuroides*]. *Ammophila breviligulata,* beaches and dunes. *Amphicarpum purshii.*

Andropogon elliottii, typ. v. & v. *gracilior, gerardii, glomeratus, scoparius,* typ. v. & v. *littoralis, ternarius, virginicus.* [*Anthoxanthum odoratum*]. *Aristida dichotoma,* typ. v. & v. *curtissii* (herb.), *lanosa, longespica,* typ. v. & v. *geniculata, oligantha, purpurascens, virgata* (herb.). [*Arrhenatherum elatius*]. [*Avena fatua*], [*sativa*]. [*Briza maxima*]. *Bromus* [*brizaeformis*], [*commutatus*], [*inermis*], [*mollis*], *pubescens* ("*purgans*"), [*racemosus*], [*secalinus*], [*sterilis*], [*tectorum*]. *Calamagrostis canadensis, cinnoides. Calamovilfa brevipilis,* one loc. *Cenchrus longispinus, tribuloides. Cinna arundinacea.* [*Coix lacryma-jobi*]. [*Cynodon dactylon*]. [*Cynosurus cristatus*]. [*Dactylis glomerata*]. *Danthonia sericea, spicata,* typ. v. & v. *longipila. Deschampsia flexuosa. Digitaria filiformis,* [*ischaemum,* typ. v. & v. *mississippiensis*], [*sanguinalis*]. *Diplachne fascicularis. Distichlis spicata,* salt-marshes. *Echinochloa* [*crusgalli,* typ. v. & v. *frumentacea*], *pungens* (*muricata*), *walteri.* [*Eleusine indica*]. *Elymus villosus,* typ. & f. *arkansanus, virginicus,* typ. v., v. *australis* (herb.), v. *glabrifolius* (herb.), v. *jejunus* (herb.), & v. *halophilus,* salt-marsh borders. *Eragrostis* [*capillaris*] (herb.), [*cilianensis*], *pectinacea,* [*pilosa*], [*poaeoides*], *spectabilis,* typ. v. & v. *sparsihirsuta. Erianthus giganteus* v. *compactus. Festuca* [*capillata*], [(*Vulpia*) *myuros*], (*Vulpia*) *octoflora* v. *tenella,* [*ovina,* typ. v. & v. *duriuscula*], [*pratensis* ("*elatior*")], [*rubra*]. *Glyceria obtusa, pallida, septentrionalis, striata. Gymnopogon ambiguus, brevifolius. Hierochloë odorata,* salt-marsh margins. [*Holcus lanatus*]. *Hordeum jubatum,* [*pusillum*] (herb.), [*vulgare*]. *Leersia oryzoides, virginica. Leptoloma cognatum.* [*Lolium multiflorum, perenne, temulentum*] (herb.), [*Manisurus rugosa*]. [*Miscanthus sinensis*]. *Muhlenbergia frondosa,* typ. v. & v. *commutata, schreberi, torreyana, uniflora. Panicum aciculare, agrostoides,* typ. v. & v. *condensum, amarulum,* dunes, *amarum,* beaches, *anceps, angustifolium, annulum, ashei, auburne, bicknellii, boscii,* typ. v. & v. *molle, caerulescens,* salt-marsh margins, *capillare, clandestinum, columbianum,* typ. v. & v. *thinium, commonsianum,* typ. v. & v. *addisonii, commutatum, depauperatum, dichotomiflorum,* incl. vars., *dichotomum,* typ. v. & v. *barbulatum, ensifolium, hemitomum, huachucae,* typ. v. & v. *silvicola, implicatum, lanuginosum, lindheimeri, linearifolium, longifolium, lucidum,* bogs, *mattamuskeetense,* typ. v. & v. *clutei, meridionale,* typ. v. & v. *albemarlense, microcarpon,* [*miliaceum*], *oligosanthes, oricola, philadelphicum, polyanthes, pseudopubescens, recognitum, scoparioides,* one loc., *scoparium, sphaerocarpon, spretum, tennesseense, trifolium, tsugetorum, verrucosum, villosissimum, virgatum,* typ. v., v. *cubense,* & v. *spissum, wrightianum. Paspalum dissectum,* shallow pools, *floridanum* v. *glabratum, laeve,* typ. v., v. *circulare,* & v. *pilosum, psammophilum, pubescens* incl. v. *muhlenbergii, setaceum,* typ. v. & v. *longepedunculatum. Phalaris arundinacea,* [*canariensis*]. [*Phleum pratense*]. *Phragmites australis. Poa* [*annua*], [*compressa*], *cuspidata,* [*nemoralis*], *palustris,* [*pratensis*], [*trivialis*]. *Puccinellia* [*distans*], saline waste ground, *fasciculata,* salt-marsh margins. *Sacciolepis striata,* shallow pools. [*Secale cereale*]. *Setaria* [*faberi*] (herb. 1942), *geniculata,* [*italica*], [*lutescens*], *magna,* brackish marshes, [*verticillata*], [*viridis*]. *Sorghastrum nutans.* [*Sorgum halepense*], [*sudanense*], [*vulgare*]. *Spartina alterniflora,* salt-marshes, *cynosuroides,* brackish marshes, *patens,* typ. v., salt-marshes, & v. *monogyna,* dune-depressions, *pectinata,* fresh-water pools. *Sphenopholis intermedia, nitida* (herb.), *obtusata. Sporobolus asper, clandestinus, vaginiflorus. Stipa avenacea. Tridens flavus,* purple f. *Triplasis purpurea. Tripsacum dactyloides. Trisetum* [*flavescens*], *pensylvanicum.* [*Triticum aestivum*]. *Uniola laxa.* [*Zea mays*]. *Zizania aquatica.*

MONOCOTS: SEDGES

CYPERACEAE: *Bulbostylis capillaris. Carex abscondita, alata, albolutescens, annectens, artitecta, atlantica, barrattii, bullata, buxbaumii, canescens* v. *disjuncta, cephalantha, cephalophora, collinsii,* sphagnum bogs, *comosa, complanata* (herb.), *crinita, debilis, emmonsii, exilis,* rare, *folliculata, glaucodea, granularis,* v. *haleana, gynandra, hirsutella,* [*hirta*], *hormathodes,* salt-marsh margins, *howei, incomperta, intumescens, lacustris,* rare, *laevivaginata, lanuginosa,* [*leavenworthii*], *leptalea,* typ. v. & v. *harperi, longii, lupulina, lurida,* [*mesochorea*], *mitchelliana* (herb.), *muhlenbergii, nigromarginata, pensylvanica, scoparia,* incl. f. *condensa, seorsa,* [*shortiana*], *silicea,* beaches [*spicata*], *straminea,* rare, *striatula, stricta, strictior, styloflexa, swanii, tetanica,* rare, [*texensis*], *tonsa, tribuloides, trisperma,* sphagnum bogs, *umbellata, venusta* v. *minor, vestita, vulpinoidea, walteriana* v. *brevis. Cladium mariscoides,* fresh-marshes. *Cyperus dentatus,* rare, *diandrus, erythrorhizos, esculentus, filicinus, filiculmis,* typ. v. & v. *macilentus, flavescens, grayii, lancastriensis, odoratus* ("*speciosus*"), *ovularis, polystachyos* v. *texensis,* rare, *retrofractus, retrorsus, rivularis, strigosus,* typ. v. & v. *robustior. Dulichium arundinaceum. Eleocharis acicularis, brittonii* (herb.), *calva, engelmannii, flavescens, melanocarpa, microcarpa* v. *filiculmis, obtusa, olivacea, parvula, quadrangulata, robbinsii, rostellata, smallii, tenuis, tortilis, tricostata, tuberculosa. Eriophorum tenellum, virginicum. Fimbristylis autumnalis, castanea, puberula. Fuirena pumila, squarrosa. Psilocarya nitens,* disjunct, *scirpoides. Rhynchospora alba, capitellata, chalarocephala* (herb.), *filifolia, fusca, globularis* v. *recognita, glomerata, gracilenta, inundata,* shallow ponds, disjunct, *macrostachya, pallida, rariflora, torreyana. Scirpus americanus, georgianus, longii, olneyi, paludosus* v. *atlanticus, robustus, rubricosus, smithii, subterminalis, validus* v. *creber. Scleria minor, muhlenbergii, nitida* (herb.), *pauciflora, reticularis,* rare, *triglomerata, verticillata.*

MONOCOTS, ADVANCED

ARACEAE: *Acorus calamus. Arisaema pusillum* (*triphyllum*), *triphyllum* (*atrorubens*). *Orontium aquaticum. Peltandra virginica. Symplocarpus foetidus.*

LEMNACEAE: *Lemna minor. Spirodela polyrhiza.*

XYRIDACEAE: *Xyris difformis, smalliana, torta* ("*caroliniana*").

ERIOCAULACEAE: *Eriocaulon compressum, decangulare, septangulare.*

COMMELINACEAE: [*Commelina communis*], [*Tradescantia virginiana*].

PONTEDERIACEAE: *Pontederia cordata.*

JUNCACEAE: *Juncus acuminatus, articulatus, biflorus, brachycarpus, bufonius, canadensis, coriaceus, debilis, dichotomus, effusus* v. *costulatus* & *solutus, gerardi,* brackish marshes, *longii* (herb.), *marginatus, militaris,* shallow ponds, *pelocarpus, platyphyllus, scirpoides, secundus, tenuis,* typ. v. & v. *anthelatus. Luzula bulbosa, echinata.*

LILIACEAE: *Aletris farinosa. Allium canadense,* [*vineale*]. [*Asparagus officinalis*]. [*Convallaria majalis*]. *Helonias bullata.* [*Hemerocallis fulva*]. *Lilium superbum,* [*tigrinum*]. *Maianthemum canadense. Medeola virginiana.* [*Muscari botryoides*]. [*Ornithogalum umbellatum*]. *Polygonatum biflorum. Smilacina racemosa* v. *cylindrata, stellata. Smilax glauca* v. *leurophylla, herbacea, laurifolia, pseudo-china, pulverulenta, rotundifolia, walteri. Trillium cernuum. Uvularia perfoliata, sessilifolia. Veratrum viride.* [*Yucca filamentosa, smalliana*] (herb.).

HAEMODORACEAE: *Lachnanthes tinctoria.*

AMARYLLIDACEAE: [*Galanthus nivalis*]. *Hypoxis hirsuta. Lophiola americana.* [*Narcissus poeticus*], [*pseudo-narcissus*].

DIOSCOREACEAE: *Dioscorea villosa,* incl. f. *glabrifolia.*

IRIDACEAE: [*Belamcanda chinensis*]. *Iris* [*germanica*], *prismatica,* [*pseudacorus*], *versicolor. Sisyrinchium angustifolium* (*graminoides*), *atlanticum.*

ORCHIDACEAE: *Arethusa bulbosa. Calopogon pulchellus. Cleistes divaricata,* rare. *Corallorhiza maculata, odontorhiza. Cypripedium acaule, calceolus* v. *pubescens,* one loc. *Goodyera pubescens. Habenaria* × *bicolor, blephariglottis,* × *canbyi, ciliaris, clavellata, cristata, integra,* rare, *lacera, nivea,* meadows, not bogs, *peramoena,* inner salt-marsh margins, rare. *Isotria verticillata. Liparis lilifolia, loeselii. Pogonia ophioglossoides. Spiranthes cernua, gracilis, lucida,* rare, *praecox,* meadows, rare, *tuberosa, vernalis. Tipularia discolor.* (Albino forms of several of the above pink-hued species occasional.)

DICOTS, FREE-PETAL

SAURURACEAE: *Saururus cernuus.*

SALICACEAE: *Populus* [*alba*], [*canescens*], [*deltoides*], [*gileadensis*], *grandidentata, heterophylla,* one loc., [*nigra* v. *italica*], *tremuloides,* one loc. *Salix* [*alba*], [*babylonica*], [*caprea*], *discolor,* [*fragilis*], *humilis,* dry woods, *nigra,* [*purpurea*], *rigida, sericea* (herb.), *tristis* (*humilis* var. *microphylla*), dry barrens.

MYRICACEAE: *Comptonia peregrina* v. *asplenifolia. Myrica cerifera, heterophylla,* × *macfarlanei, pensylvanica.*

JUGLANDACEAE: *Carya cordiformis, glabra, ovalis, tomentosa. Juglans nigra.*

CORYLACEAE: *Alnus serrulata. Betula nigra, populifolia. Carpinus caroliniana* v. *virginiana.*

FAGACEAE: *Castanea dentata. Fagus grandifolia,* Coastal Plain representative. *Quercus alba, coccinea, falcata,* incl. vars., × *heterophylla, ilicifolia, laurifolia,* × *ludoviciana,* [*macrocarpa*], *marilandica,* [*muhlenbergii*], *nigra, palustris, phellos, prinoides, prinus, rubra,* × *rudkinii,* × *saulii, stellata, velutina*; & uncertain hybrids.

ULMACEAE: *Celtis occidentalis. Ulmus* [*americana*], [*procera,* etc.].

MORACEAE: [*Broussonetia papyrifera*]. [*Maclura pomifera*]. *Morus* [*alba*], *rubra.*

CANNABINACEAE: [*Cannabis sativa*]. [*Humulus japonicus, lupulus*].

URTICACEAE: *Boehmeria cylindrica. Pilea pumila.* [*Urtica dioica*].

SANTALACEAE:*Comandra umbellata.*

LORANTHACEAE: *Phoradendron serotinum.*

ARISTOLOCHIACEAE: *Aristolochia serpentaria.*

POLYGONACEAE: [*Fagopyrum sagittatum*]. *Polygonella articulata. Polygonum arifolium* v. *pubescens, aviculare,* [typ. v.], v. *littorale,* & [v. *vegetum*], *coccineum,* [*convolvulus*], *cristatum,* [*cuspidatum* (*Reynoutria japonica*)], *densiflorum, erectum, glaucum,* damp sands, [*hydropiper*], *hydropiperoides, lapathifolium, opelousanum,* [*orientale*], *pensylvanicum,* typ. v. & v. *laevigatum,* [*persicaria*], *prolificum,* brackish marshes, *punctatum, ramosissimum* f. *atlanticum,* (herb), *robustius,* [(*Reynoutria*) *sachalinense*], *sagittatum, scandens,* (herb.), *setaceum, tenue. Rumex* [*acetosa*], [*acetosella*], *altissimus,* rare, [*crispus*], [*mexicanus*], [*obtusifolius*], [*patientia*], [*sanguineus*], *verticillatus. Tovara virginiana.*

CHENOPODIACEAE: *Atriplex arenaria,* beaches, *patula* v. *hastata.* [*Bassia hirsuta*]. [*Beta vulgaris*]. *Chenopodium* [*album,* typ. v. & v. *lanceolatum*], [*ambrosioides,* typ. v. & v. *anthelminticum*], [*botrys*], *bushianum, gigantospermum, leptophyllum,* beaches, *missouriense,* [*murale*], *strictum,* [*urbicum*], [*vulvaria*]. [*Cycloloma atriplicifolium*]. [*Kochia scoparia* cv. *culta*]. *Salicornia bigelovii, europaea, virginica. Salsola kali,* typ. v. & [v. *tenuifolia*]. [*Spinacia oleracea*]. *Sueda linearis, maritima.*

AMARANTHACEAE: *Amaranthus albus, cannabinus,* [*caudatus* (*cruentus*)], *graecizans,* [*hybridus,* typ. & cv. *hypochondriacus*], *pumilus,* beaches, [*retroflexus*], [*spinosus*], [*tamariscinus*], [*tricolor*].

PHYTOLACCACEAE: *Phytolacca americana.*

AIZOACEAE: *Sesuvium maritimum,* brackish sands.

MOLLUGINACEAE: [*Mollugo verticillata*].

TETRAGONIACEAE: [*Tetragonia tetragonioides*].

PORTULACACEAE: *Claytonia virginica,* rare. [*Portulaca grandiflora, oleracea*].

CARYOPHYLLACEAE: [*Agrostemma githago*]. *Arenaria peploides* v. *robusta,* beaches, [*serpyllifolia*]. *Cerastium arvense,* [*glomeratum* (*viscosum*)], [*holostioides* (*vulgatum*)], [*semidecandrum*]. [*Dianthus armeria*], [*barbatus*]. [*Holosteum umbellatum*]. [*Lychnis* (*Silene*) *alba*], [*coronaria*], [(*Silene*) *dioica*]. *Moehringia lateriflora. Paronychia fastigiata.* [*Petrorhagia* (*Dianthus*) *prolifer*], [(*Tunica*) *saxifraga*]. *Sagina decumbens, procumbens.* [*Saponaria officinalis*]. [*Scleranthus annuus*]. *Silene antirrhina,* [*armeria*], *caroliniana* v. *pensylvanica,* [*conica*], [*dichotoma*], [*gallica*], [*noctiflora*], *stellata,* [*vulgaris* (*cucubalus*)]. [*Spergula arvensis*], [*pentandra,* only U.S. record]. *Spergularia marina,* [*rubra*]. [*Stellaria graminea*], [*media*]. [*Vaccaria pyramidata*].

CERATOPHYLLACEAE: *Ceratophyllum echinatum.*

NYMPHAEACEAE: *Brasenia schreberi. Nuphar fraternum* (*advena*), *microphyllum,* rare. *Nymphaea odorata,* typ. v. & v. *gigantea.*

RANUNCULACEAE: *Anemone* [*canadensis*], *quinquefolia, virginiana. Aquilegia canadensis,* typ. & f. *flaviflora,* one loc., [*vulgaris*]. *Caltha palustris.* [*Cimicifuga racemosa*]. *Clematis* [*dioscoreifolia*], [*ligusticifolia*], *virginiana.* [*Delphinium ajacis* (*Consolida ambigua*)]. [*Nigella damascena*]. *Ranunculus* [*acris*], [*arvensis,* along railroad], [*bulbosus*], *hispidus,* typ. v. & v. *falsus, recurvatus,* [*repens*], [*sardous*], *sceleratus, septentrionalis,* one loc. *Thalictrum* [*dioicum*], *polygamum, revolutum.*

BERBERIDACEAE: [*Berberis thunbergii*]. *Podophyllum peltatum.*

MENISPERMACEAE: *Menispermum canadense.*

MAGNOLIACEAE: *Liriodendron tulipifera. Magnolia virginiana.*

LAURACEAE: *Lindera benzoin. Sassafras albidum,* typ. v. & v. *molle.*

PAPAVERACEAE: [*Argemone alba*], [*mexicana*]. [*Chelidonium majus*]. [*Papaver dubium*], [*rhoeas*], [*somniferum*]. *Sanguinaria canadensis.*

FUMARIACEAE: [*Adlumia fungosa*]. *Corydalis flavula,* one loc. [*Fumaria officinalis*].

CRUCIFERAE: [*Arabidopsis thaliana*]. *Arabis drummondii, glabra, lyrata.* [*Armoracia lapathifolia* (*rusticana*)]. [*Barbarea verna*], [*vulgaris,* typ. v. & v. *arcuata*]. [*Berteroa incana*]. [*Brassica rapa* (*"campestris," "napus"*)], [*hirta* (*alba*)], [*juncea,* typ. & cv. *crispifolia*], [*kaber* v. *pinnatifida* (*arvensis*)], [*nigra*], [*oleracea*]. *Cakile edentula,* beaches. [*Camelina microcarpa*], [*sativa*]. [*Capsella bursa-pastoris*]. *Cardamine parviflora* v. *arenicola, pensylvanica.* [*Cardaria draba*]. [*Conringia orientalis*]. *Descurainia pinnata* v. *brachycarpa*]. [*Draba* (*Erophila*) *verna*]. [*Eruca sativa*]. [*Erysimum cheiranthoides*]. [*Hesperis matronalis*]. *Lepidium* [*campestre*], [*densiflorum*], [*sativum*], *virginicum.* [*Lobularia maritima*]. [*Lunaria annua*]. [*Nasturtium officinale*]. [*Neslia paniculata*]. [*Raphanus raphanistrum*], [*sativus*]. *Rorippa islandica* v. *fernaldiana* & v. *hispida,* [*sylvestris*]. [*Sisymbrium altissimum*], [*officinale,* typ. v. & v. *leiocarpum*]. [*Thlaspi arvense*].

CAPPARIDACEAE: [*Cleome houteana*].

RESEDACEAE: [*Reseda alba*], [*lutea*], [*odorata*].

SARRACENIACEAE: *Sarracenia purpurea.*

DROSERACEAE: *Drosera filiformis, intermedia, rotundifolia.*

CRASSULACEAE: [*Sedum acre, alboroseum, telephium* v. *purpureum* & misc. garden waifs]. [*Sempervivum tectorum*].

SAXIFRAGACEAE: *Chrysosplenium americanum,* rare. *Heuchera americana,* rare. *Itea virginica. Penthorum sedoides.* [*Ribes grossularia*], [*rubrum*]. *Saxifraga pensylvanica, virginiensis,* rare.

HAMAMELIDACEAE: *Hamamelis virginiana,* rare. *Liquidambar styraciflua.*

PLATANACEAE: [*Platanus × acerifolia*], [*occidentalis*].

ROSACEAE, *sens. lat.*: *Agrimonia parviflora,* rare, *pubescens. Amelanchier canadensis. Aronia* (*Pyrus*), *arbutifolia, atropurpurea* (*P. floribunda*), *melano-*

carpa. Crataegus crus-galli, intricata (herb.), [*monogyna*], *pruinosa, uniflora. Fragaria* [× *ananassa*], *virginiana,* typ. v. & v. *illinoensis. Geum canadense, virginianum. Malus* (*Pyrus*) *angustifolia* typ. v. & v. *spinosa,* [*domestica*]. *Potentilla* [*argentea*], *canadensis,* [*intermedia*], *norvegica,* [*recta*], *simplex. Prunus americana,* rare, *angustifolia,* rare, [*avium*], [*cerasus*], [*domestica*], [*hortulana*], [insititia], [*mahaleb*], *maritima,* [*persica*], *serotina,* [*spinosa*]. [*Pyrus communis*]. *Rosa* [*canina*], *carolina,* [*eglanteria*], [*gallica*], [*multiflora*], *palustris,* [*spinosissima*], *virginiana. Rubus andrewsianus,* [*bellobatus,* cv. *'Kittatinny'*], *cuneifolius, enslenii, flagellaris, frondosus,* [*fruticosus*], *hispidus, hypolasius* (herb.), [*idaeus*], [*laciniatus*], [*laudatus,* cv. *'Bundy'*], *longii* (herb.), [*nigrobaccus,* cv. 'Wilson'], *occidentalis,* typ. & f. *pallidus, originalis* (herb.), type loc. Cold Spring, *pensilvanicus,* [*phoenicolasius*], [*procerus*], *recurvans,* [*roribaccus,* cv. 'Lucretia']. *Sanguisorba canadensis. Spiraea latifolia,* [*salicifolia*], *tomentosa.*[2]

Leguminosae, *sens. lat.*: *Amphicarpa bracteata, comosa.* [*Anthyllis vulneraria*], *Apios americana. Baptisia* [*australis*], *tinctoria. Cassia fasciculata, hebecarpa, nictitans. Centrosema virginianum.* [*Cicer arietinum*]. *Clitoria mariana.* [*Coronilla varia*]. *Crotalaria sagittalis.* [*Cytisus scoparius*]. *Desmodium canadense, canescens, ciliare, dillenii* (*perplexum*), *laevigatum, marilandicum, nudiflorum, paniculatum, rigidum, rotundifolium, strictum, viridiflorum. Galactia regularis, volubilis.* [*Gleditsia triacanthos*]. [*Lathyrus japonicus* v. *glaber, latifolius*], [*pratensis*], [*tuberosus*]. *Lespedeza angustifolia, capitata, hirta, intermedia, nuttallii, procumbens, repens,* [*sericea*], [*striata*], *stuevei, virginica. Lupinus perennis.* [*Medicago falcata*], [*lupulina*], [*sativa*]. [*Melilotus alba*], [*officinalis*]. *Phaseolus polystachios,* [*vulgaris*]. [*Robinia hispida*], [*pseudo-acacia*]. *Strophostyles helvola, umbellata. Stylosanthes biflora. Tephrosia virginiana.* [*Trifolium arvense*], [*aureum* ("*agrarium*")], [*campestre* ("*procumbens*")], [*dubium*], [*hybridum*], [*incarnatum,* typ. & f. *albiflorum*], [*medium*], [*pratense,* typ. & f. *leucochraceum*], [*repens*]. [*Vicia angustifolia*], [*dasycarpa*], [*grandiflora*], [*hirsuta*], [*pannonica*], [*sativa*], [*tetrasperma*], [*villosa*].

Geraniaceae: [*Erodium cicutarium*]. *Geranium carolinianum,* [*columbinum*], *maculatum,* [*molle*], [*pusillum*], *robertianum,* [*sibiricum*].

Oxalidaceae: *Oxalis* [*corniculata*], *europaea, filipes,* rare, *stricta, violacea.*

Linaceae: *Linum intercursum, medium* v. *texanum, striatum,* [*usitatissimum*], *virginianum.*

Rutaceae: [*Ruta graveolens*].

Simaroubaceae: [*Ailanthus altissima*].

Polygalaceae: *Polygala cruciata* v. *aquilonia, lutea, mariana, nuttallii, ramosa,* rare, *sanguinea, verticillata,* typ. v., v. *ambigua,* rare, & v. *isocycla.*

Euphorbiaceae: *Acalypha gracilens, rhomboidea, virginica. Croton glandulosus* v. *septentrionalis. Euphorbia corollata,* [*cyparissias*], *ipecacuanhae,* [*lathyrus*],

---

[2] A member of this Family, *Dalibarda repens,* was reported from Bennett Bogs by Montgomery and Fairbrothers (1963) but is improbable and unconfirmed.

[*marginata*], *nutans* (*maculata*, GM), [*peplus*], *polygonifolia*, beaches, *purpurea*, *supina*. [*Mercurialis annua*]. [*Ricinus communis*].

CALLITRICHACEAE: *Callitriche deflexa* v. *austinii*, *heterophylla*.

ANACARDIACEAE: *Rhus copallina*, typ. v. & v. *latifolia* (herb.), *glabra*, *radicans*, typ. & f. *malacotrichocarpa*, *toxicodendron* (*quercifolia*), *typhina*, *vernix*.

AQUIFOLIACEAE: *Ilex glabra*, *laevigata*, *opaca*, *verticillata*.

CELASTRACEAE: *Celastrus scandens*. *Euonymus americanus*, [*atropurpureus*, *europaeus*].

ACERACEAE: *Acer* [*campestre*], [*negundo*], [*platanoides*], [*pseudoplatanus*], *rubrum*, typ. v. & v. *trilobum*, [*saccharinum*].

SAPINDACEAE: [*Cardiospermum halicacabum*].

BALSAMINACEAE: *Impatiens capensis* ("*biflora*").

RHAMNACEAE: *Ceanothus americanus*.

VITACEAE: *Parthenocissus quinquefolia*, incl. f. *hirsuta*. *Vitis aestivalis*, *labrusca*.

MALVACEAE: [*Abutilon theophrasti*]. [*Althaea rosea*] (herb.). *Hibiscus moscheutos*, *palustris*, [*syriacus*], [*trionum*]. *Kosteletzkya virginica*, brackish marshes. [*Malva moschata*], [*neglecta*], [*sylvestris*]. [*Sida spinosa*].

GUTTIFERAE: *Ascyrum* (*Hypericum*) *hypericoides*, *stans*. *Hypericum adpressum*, *boreale*, *canadense*, *densiflorum*, *denticulatum*, *dissimulatum*, (*Sarothra*) *gentianoides*, *mutilum*, [*perforatum*], *punctatum*. *Triadenum virginicum*, *walteri*, one loc.

CISTACEAE: *Helianthemum canadense*, *propinquum*. *Hudsonia ericoides*, rare, *tomentosa*. *Lechea leggettii*, *maritima*, dunes, *minor*, *racemulosa*, *villosa*.

VIOLACEAE: *Viola affinis*, [*arvensis*], *brittoniana*, *conspersa*, *cucullata* × *emarginata*, *fimbriatula*, *lanceolata*, [*odorata*], *palmata*, *pectinata*, *pedata*, lavender & albino f., *primulifolia*, *rafinesquii*, *sagittata*, typ. & glabrescent f., *sororia*, typ. & glabrescent f., *striata*, [*tricolor*], *triloba*, & uncertain hybrids.

CACTACEAE: *Opuntia compressa* (*humifusa*).

LYTHRACEAE: *Cuphea* [*ignea*], *petiolata*. *Decodon verticillatus*. *Lythrum* [*alatum*], *lineare*, salt-marsh borders, [*salicaria*]. *Rotala ramosior*.

NYSSACEAE: *Nyssa sylvatica*.

MELASTOMACEAE: *Rhexia mariana*, *virginica*.

ONAGRACEAE: *Epilobium angustifolium*, *coloratum*. *Gaura* [*villosa*]. *Ludwigia alternifolia*, *hirtella*, *linearis*, *palustris* v. *americana*, *sphaerocarpa*. *Oenothera biennis*, *fruticosa* v. *linearis*, [*grandiflora*], *humifusa*, beaches, [*laciniata*, typ. v. & v. *grandiflora*], & uncertain hybrids.

HALORAGACEAE: *Myriophyllum humile*, incl. f. *capillaceum*, *pinnatum*. *Proserpinaca intermedia*, *palustris*, incl. v. *crebra*, *pectinata*.

ARALIACEAE: *Aralia nudicaulis*, [*Hedera helix*].

UMBELLIFERAE: [*Aegopodium podagraria*, typ. & cv. *variegatum*]. [*Ammi majus*]. [*Anethum graveolens*]. *Angelica venenosa*. [*Anthriscus cerefolium*]. [*Apium graveolens*]. [*Carum carvi*]. *Cicuta maculata*. [*Conium maculatum*].

[*Daucus carota*]. *Eryngium aquaticum.* [*Foeniculum vulgare*]. *Hydrocotyle umbellata, verticillata,* typ. v. & v. *triradiata* (*"canbyi"*). *Lilaeopsis chinensis,* brackish marshes, rare. *Oxypolis rigidior,* typ. v. & v. *ambigua.* [*Pastinaca sativa*]. [*Petroselinum crispum*]. *Ptilimnium capillaceum. Sanicula canadensis, marilandica. Sium suave.* [*Torilis japonica*]. *Zizia aurea.*

CORNACEAE: *Cornus alternifolia, amomum,* rare, *florida,* typ. & f. *rubra, racemosa.*

DICOTS, UNITED-PETAL

CLETHRACEAE: *Clethra alnifolia.*

ERICACEAE, *sens. lat.*: *Arctostaphylos uva-ursi* v. *coactilis. Chamaedaphne calyculata* v. *angustifolia. Chimaphila maculata, umbellata* v. *cisatlantica. Epigaea repens. Gaultheria procumbens. Gaylussacia baccata, dumosa, frondosa. Kalmia angustifolia, latifolia,* typ. v. & v. *laevipes. Leucothoe racemosa. Lyonia ligustrina, mariana. Monotropa hypopithys,* typ. v. & v. *rubra, uniflora. Pyrola rotundifolia* v. *americana, secunda,* rare. *Rhododendron periclymenoides* (*"nudiflorum"*), *viscosum,* typ. v. & v. *glaucum. Vaccinium atrococcum, caesariense, corymbosum,* typ. v. & v. *glabrum, macrocarpon, vacillans,* & uncertain hybrids.

DIAPENSIACEAE: *Pyxidanthera barbulata.*

PRIMULACEAE: [*Anagallis arvensis,* typ. v. & v. *caerulea*]. *Hottonia inflata,* appearing in ponds at long intervals. *Lysimachia ciliata,* rare, *hybrida,* [*nummularia*], [*punctata*], *quadrifolia, terrestris,* [*vulgaris*]. *Samolus parviflorus. Trientais borealis.*

PLUMBAGINACEAE: *Limonium carolinianum, nashii,* both salt-marshes.

EBENACEAE: *Diospyros virginiana.*

OLEACEAE: *Chionanthus virginicus. Fraxinus americana* v. *juglandifolia* (Rehder), [*excelsa*], *pennsylvanica,* typ. v. & v. *subintegerrima* (*lanceolata*). [*Ligustrum vulgare*]. [*Syringa vulgaris*].

GENTIANACEAE: *Bartonia paniculata, virginica.* [*Centaurium pulchellum*]. *Gentiana autumnalis* (*"porphyrio, stoneana"*), typ. & f. *albescens, crinita,* rare, *saponaria. Menyanthes trifoliata* v. *minor. Nymphoides cordata. Sabatia angularis, campanulata,* salt-marsh borders, *difformis, dodecandra,* typ. & albino f., *stellaris,* salt-marsh borders.

APOCYNACEAE: [*Amsonia tabernaemontana*]. *Apocynum cannabinum,* typ. v. & v. *pubescens, medium.* [*Vinca major, minor*].

ASCLEPIADACEAE: *Asclepias amplexicaulis, incarnata* v. *pulchra, lanceolata,* salt-marsh margins, *purpurascens, rubra, syriaca, tuberosa, variegata, verticillata,* (*Acerates*) *viridiflora.* [*Periploca graeca*].

CONVOLVULACEAE: *Calystegia* (*Convolvulus*) [*pubescens,* double], *sepium,* typ. & f. *malacophylla.* [*Convolvulus arvensis*]. *Cuscuta compacta, coryli,* [*epithymum*], *gronovii,* typ. v. & v. *latiflora, pentagona. Ipomoea* [*coccinea*], [*hederacea*], *lacunosa, pandurata,* [*purpurea*].

POLEMONIACEAE: [*Ipomopsis* (*"Gilia"*) *rubra*]. *Phlox* [*drummondii*], *maculata,* typ. & albino f., [*paniculata*], [*subulata,* typ. & albino f.].

HYDROPHYLLACEAE: [*Hydrophyllum virginianum*].

BORAGINACEAE: [*Echium vulgare*]. *Hackelia virginiana,* rare. [*Lappula echinata*]. [*Lithospermum arvense*]. *Myosotis* [*scorpioides*], [*stricta*], [*sylvatica*], *verna.*

VERBENACEAE: *Lippia* (*Phyla*) *lanceolata,* salt-marsh margins. *Verbena hastata,* [*officinalis*], *simplex,* [*stricta*], *urticifolia.*

LABIATAE: *Cunila origanoides.* [*Glechoma hederacea*]. *Hedeoma pulegioides.* [*Lamium amplexicaule*]. [*Leonurus cardiaca*], [*marrubiastrum*]. *Lycopus americanus, amplectens,* bogs, *rubellus,* rare, *uniflorus, virginicus.* [*Marrubium vulgare*]. [*Melissa officinalis*]. [*Mentha alopecuroides*], [*longifolia*], [*piperita*], [*rotundifolia*], [*spicata*]. *Monarda* [*didyma*], [*fistulosa*], [*media*], *punctata.* [*Nepeta cataria*]. [*Perilla frutescens,* typ. & cv. *crispa*]. *Physostegia* [*virginiana,* typ. & cv. *speciosa*]. *Prunella* [*laciniata*], *vulgaris* v. *lanceolata. Pycnanthemum incanum, muticum,* rare, *tenuifolium. Salvia lyrata,* [*officinalis*], [*pratensis*], [*reflexa*], [*sclarea*]. [*Satureja acinos*], [*vulgaris* v. *neogaea*]. *Scutellaria elliptica, epilobiifolia, integrifolia, lateriflora. Stachys* [*olympica*], *tenuifolia* v. *platyphylla. Teucrium canadense,* typ. v., *Trichostema dichotomum, setaceum.*

SOLANACEAE: [*Datura innoxia*], [*stramonium,* typ. v. & v. *tatula*]. [*Lycium halimifolium*]. [*Lycopersicum esculentum*]. [*Nicandra physalodes*]. [*Petunia axillaris*], [*hybrida*]. *Physalis heterophylla* v. *ambigua, subglabrata, virginiana. Solanum carolinense,* [*dulcamara*], *nigrum* (incl. *"americanum"*), [*rostratum*], [*tuberosum*].

SCROPHULARIACEAE: *Agalinis maritima,* salt-marshes, *purpurea,* typ. & f. *albiflora, racemulosa, setacea, tenuifolia.* [*Antirrhinum majus*]. *Aureolaria flava, pedicularia, virginica. Chelone glabra.* [*Cymbalaria muralis*]. [*Digitalis lanata*], [*purpurea*]. *Gratiola aurea, neglecta,* (*Tragiola*) *pilosa, virginiana.* [*Kicksia elatine*]. *Linaria canadensis,* typ. & f. *albina,* [*vulgaris*]. *Lindernia anagallidea, dubia. Melampyrum lineare* v. *latifolium* & v. *pectinatum. Mimulus* [*moschatus*], *ringens. Pedicularis canadensis, lanceolata,* rare. [*Penstemon digitalis*]. *Schwalbea americana,* rare. *Scrophularia lanceolata,* rare. [*Verbascum blattaria,* white & yellow f.], [*nigrum*], [*thapsus*]. *Veronica* [*arvensis*], *longifolia, officinalis, peregrina,* [*persica*], [*polita*], [*serpyllifolia*]. [*Veronicastrum virginicum*].

BIGNONIACEAE: *Campsis radicans.* [*Catalpa bignonioides*], [*speciosa*]. [*Paulownia tomentosa*].

MARTYNIACEAE: [*Proboscidea louisianica*].

OROBANCHACEAE: [*Orobanche minor*].

LENTIBULARIACEAE: *Utricularia cornuta, fibrosa, geminiscapa, gibba, inflata,* typ. v. & v. *minor, juncea,* typ. & f. *virgatula, purpurea, resupinata, subulata,* typ. & f. *cleistogama, vulgaris.*

ACANTHACEAE: *Ruellia carolinensis* v. *cheloniformis.*

Phrymaceae: *Phryma leptostachya.*

Plantaginaceae: *Plantago* [*aristata*], [*indica*], *juncoides* v. *decipiens,* salt-marsh margins, [*lanceolata*], [*major,* typ. v.] & v. *scopulorum,* salt-marsh margins, *pusilla, rugelii, virginica.*

Rubiaceae: *Cephalanthus occidentalis. Diodia teres, virginiana,* typ. & f. *hirsuta. Galium aparine, circaezans,* typ. v. & v. *hypomalacum, hispidulum, obtusum, pilosum,* typ. v. & v. *puncticulosum, tinctorium, triflorum,* [*verum*]. *Mitchella repens. Oldenlandia uniflora.* [*Sherardia arvensis*].

Caprifoliaceae: *Lonicera* [*japonica*], *sempervirens. Sambucus canadensis.* [*Symphoricarpos albus, orbiculatus*]. *Triosteum perfoliatum. Viburnum acerifolium,* rare, *cassinoides, dentatum,* [*lantana*], *nudum,* [*opulus*], *prunifolium, recognitum.*

Valerianaceae: [*Valeriana officinalis*]. *Valerianella* [*olitoria*], *radiata.*

Cucurbitaceae: [*Citrullus vulgaris*]. [*Cucumis melo*], [*sativus*]. [*Cucurbita maxima*], [*moschata*], [*pepo*]. [*Echinocystis lobata*]. [*Lagenaria vulgaris*]. [*Sicyos angulatus*].

Campanulaceae: *Campanula aparinoides,* rare, [*rapunculoides*]. *Triodanis* (*"Specularia"*) *perfoliata.*

Lobeliaceae: *Lobelia canbyi, cardinalis,* typ. & f. *alba, inflata, nuttallii,* typ. & albino f., *puberula,* typ. & f. *candida,* [*siphilitica*], [*spicata*].

COMPOSITAE: CHICORY SUBFAMILY

[*Chondrilla juncea*]. [*Cichorium intybus,* typ. & f. *album*]. [*Crepis capillaris*]. *Hieracium* [*aurantiacum*], *gronovii, paniculatum,* rare, [*pratense*], *scabrum, venosum,* typ. v. & v. *nudicaule.* [*Hypochoeris radicata*]. *Krigia biflora, dandelion, virginica. Lactuca biennis, canadensis* v. *latifolia, hirsuta* v. *sanguinea,* [*scariola,* typ. & f. *integrifolia*]. [*Lapsana communis*]. [*Leontodon leysseri*]. [*Picris echioides*], [*hieracioides*]. *Prenanthes autumnalis, serpentaria, trifoliolata.* [*Sonchus arvensis*], [*asper*], [*oleraceus*], [*uliginosus*]. [*Taraxacum laevigatum*], [*officinale*]. [*Tragopogon porrifolius*].

COMPOSITAE: "ASTER" SUBFAMILY

[*Achillea millefolium,* typ. & f. *rosea*], [*ptarmica*]. [*Actinomeris* (*Verbesina*) *alternifolia*]. *Ambrosia artemisiifolia, trifida,* typ. & f. *integrifolia. Anaphalis margaritacea,* rare. *Antennaria fallax, neglecta, neodioica, parlinii, plantaginifolia.* [*Anthemis arvensis*], [*cotula*]. [*Arctium lappa*], [*minus*]. [*Artemisia abrotanum*], [*absinthium*], [*annua*], [*ludoviciana* v. *gnaphalodes*], [*pontica, stelleriana,* dune-hollows], [*vulgaris*]. *Aster* [*amethystinus*], *concolor,* [*cordifolius*], *divaricatus,* rare, *dumosus,* typ. v. & v. *coridifolius, gracilis, lateriflorus, linariifolius,* [*macrophyllus*], *nemoralis, novae-angliae,* typ. & f. *roseus, novi-belgii,* typ. v., v. *elodes* & v. *litoreus,* salt-marsh borders, *patens, pilosus,* typ. v., v. *demotus* & v. *platyphyllus, puniceus, simplex, spectabilis, subulatus,* salt-marshes, *tenuifolius,* salt-marshes, *umbellatus, undulatus, vimineus. Baccharis halimifolia.* [*Bellis perennis*]. *Bidens bipinnata, cernua, comosa, connata* v. *petiolata, coronata,* typ. v. & v. *trichosperma, discoidea, frondosa, laevis, polylepis. Boltonia asteroides* v. *glastifolia.* [*Carduus acanthoides*], [*crispus*], [*nutans*] (herb.). [*Centaurea cyanus*], [*jacea*], [*maculosa*], [*nigra*], [*solstitialis*]. [*Chrysanthemum leucanthemum* v. *pinnatifidum*], [*parthenium*]. *Chrysopsis* (*Heterotheca*) *mariana. Cirsium* [*arvense*], *discolor, horridulum, muticum,* [*vulgare*]. [*Coreopsis lanceolata,* including *"grandiflora"*], [*tinctoria*]. *Eclipta alba. Erechtites hieracifolia. Erigeron annuus, canadensis, philadelphicus, pulchellus, pusillus, strigosus,* typ. & f. *discoideus. Eupatorium album,* typ. v., v. *monardifolium,* rare, & v. *subvenosum, aromaticum, capillifolium, coelestinum* typ. & f. *album, dubium, fistulosum, hyssopifolium,* typ. v. & v. *calcaratum, leucolepis, perfoliatum, pilosum* (*"verbenaefolium"*), *pubescens, resinosum,* bogs, *rotundifolium,* [*rugosum*]. [*Gaillardia pulchella*]. [*Galinsoga ciliata*], [*parviflora*]. *Gnaphalium obtusifolium,* typ. v. & v. *micradenium,* [*peregrinum*] (herb.), *purpureum, uliginosum.* [*Grindelia squarrosa*]. *Helenium autumnale,* [*nudiflorum*]. *Helianthus angustifolius,* [*annuus*], *divaricatus, giganteus,* [*laetiflorus*], [*strumosus,* rare, *tuberosus*]. [*Heliopsis helianthoides*]. [*Heterotheca subaxillaris*]. [*Inula helenium*]. *Iva* (*frutescens* v.) *oraria, xanthifolia. Liatris graminifolia,* lavender & albino forms. *Mikania scandens.* [*Parthenium hysterophorus*]. *Pluchea camphorata,* lavender & albino forms, salt-marshes, *foetida,* rare. [*Rudbeckia fulgida*], [*serotina*]. *Sclerolepis uniflora. Senecio aureus* v. *intercursus, tomentosus,* [*vulgaris*]. *Sericocarpus asteroides, linifolius.* [*Silphium perfoliatum*]. *Solidago altissima, bicolor, caesia, elliottii* v. *ascendens, erecta, fistulosa, gigantea, graminifolia,* typ. v. & v. *nuttallii, juncea, ludoviciana, nemoralis, odora, puberula, rigida, rugosa,* typ. v., v. *aspera* & v. *sphagnophila, sempervirens, tenuifolia, uliginosa,* typ. v. & v. *linoides.* [*Tanacetum vulgare*]. *Vernonia noveboracensis,* typ. & f. *albiflora. Xanthium chinense, echinatum,* beaches, *italicum, pensylvanicum,* [*spinosum*].

DISCUSSION

Cape May County is notable for the diversity of its vascular flora. This check-list includes 1150 native and 550 introduced taxa known from the County. The rich grass flora is composed of 230 entities in 68 genera. Of these, 161 are native (135 species, 25 varieties, and 1 form) and 69 are introduced (66 species, 3 varieties). Woody plants are represented by 241 taxa, of which 11 are coniferous trees (7 native species, 4 introduced species), 95 are broadleaved trees (46 species, 4 varieties, 1 form, and 4 hybrids native; 39 species and 1 hybrid introduced), and 135 are broadleaved shrubs (92 species, 4 varieties, 3 forms, and 1 hybrid native; 35 species and cultivars introduced). The largest New Jersey specimens of six tree species are reported from Cape May County (Anon., 1969).

The ranges of at least 25 taxa of southern affinity extend to, but not beyond, Cape May County (Table 1). Many of these taxa grow on, and may have spread across Delaware Bay from, the Delmarva Peninsula.

TABLE 1. — Taxa which reach their northern limit of distribution in Cape May County, New Jersey. For taxa which occur only disjunctly farther south, the nearest known station is indicated.

Botrychium biternatum
Andropogon ternarius
Manisuris rugosa
Panicum aciculare
P. amarulum
P. angustifolium
P. caerulescens (se. Va.)
Sacciolepis striata
Eleocharis brittonii (se. N.C.)
E. flavescens
Rhynchospora filifolia
R. glomerata
Juncus coriaceus
Habenaria nivea
Polygonum densiflorum
Malus angustifolia
Rubus hypolasius (se. Va.)
Polygala ramosa
Triadenum walteri
Lippia lanceolata
Ruellia caroliniensis v. *cheloniformis*
Galium hispidulum
Valerianella radiata
Krigia dandelion (se. Va.)
Solidago ludoviciana

Although the climate is relatively mild, 17 taxa of northern affinity occur in Cape May County but have not been found on the Atlantic Coastal Plain south of Delaware Bay (Table 2). The ranges of a few of these taxa do extend to lower latitudes in the Piedmont and Appalachian uplands.

TABLE 2. — Taxa which reach their southern limit of distribution on the Coastal Plain in Cape May County, New Jersey.

Potamogeton confervoides
P. oakesianus
Hierochloë odorata
Muhlenbergia uniflora
Carex cephalantha
C. granularis v. *haleana*
C. trisperma
Eriophorum tenellum
Scirpus paludosus v. *atlanticus*
Cerastium arvense
Moehringia lateriflora
Arabis drummondii
Rubus andrewsianus
R. recurvans
Arctostaphylos uva-ursi v. *coactilis*
Menyanthes trifoliata v. *minor*
Plantago juncoides v. *decipiens*

PERTINENT LITERATURE

ALEXANDER, R. C. 1949. Noteworthy trees of Cape May County, New Jersey. Cape May Geogr. Soc., 40 pp.

————. 1951. Bennett Bog. Cape May Geogr. Soc. Ann. Bull. 5:10-16.

ANON. 1969. List of New Jersey's biggest trees. Rutgers University, Coll. of Agr. and Env. Sci., Coop. Ext. Leafl. 440:1-7.

ATWELL, C. B. 1932. Three dune associations compared. Torreya 32:109-115.

BENNER, W. M., & F. W. PENNELL. 1947. Otway H. Brown. Bartonia No. 24:80-81.

BERNARD, JOHN M. 1963. Lowland forests of the Cape May Formation in southern New Jersey. Bull. New Jersey Acad. Sci. 8:1-12.

BROWN, O. H. 1913a. Recent additions to our knowledge of the flora of southern New Jersey. Proc. Acad. Nat. Sci. Phila. 65:457-459.

————. 1913b. Noteworthy plants from southern New Jersey — *Quercus nigra* L. Bartonia No. 5:14.

————. 1914. Some additions to the flora of New Jersey. Bartonia No. 6:20.

CRAWFORD, JOSEPH. 1900. Tree growth on Five-Mile Beach. Forest Leaves 7:92.

FENDER, FLORA S. 1938. The flora of Seven Mile Beach, New Jersey. Bartonia No. 19:23-41.

FERNALD, M. L. 1950. Gray's manual of botany. 8th ed. American Book Co., New York, 1632 pp.

GILL, H. E. 1959. Geology and ground-water resources of the Cape May Peninsula, lower Cape May County, New Jersey. U.S. Geol. Surv. Water Res. Circ. 1, 19 pp.

GOOD, RALPH E. 1965. Salt marsh vegetation, Cape May, New Jersey. Bull. New Jersey Acad. Sci. 10:1-11.

HARRISON, J. B. 1889. The forests and woodlands of New Jersey — IV. Garden and Forest 2:117-118.

HARSHBERGER, J. W. 1900. An ecological study of the New Jersey strand flora. Proc. Acad. Nat. Sci. Phila. 52:623-671.

————. 1902. Additional observations on the strand flora of New Jersey. Proc. Acad. Nat. Sci. Phila. 54:642-669.

————. 1903. Forest growth at Wildwood, New Jersey. Forest Leaves 9:40.

KILLIP, E. P. 1919. A year's collecting in the northeastern United States. Am. Fern Jour. 8:121-126.

KINDLE, E. M. 1937. Post hurricane sea shore observations. Amer. Midl. Nat. 18:426-434.

LEWIS, J. V., & H. B. KÜMMEL. 1950. Geologic map of New Jersey, 1910-1912. Revised by H. B. Kümmel, 1931, and M. E. Johnson, 1950. New Jersey Dept. of Conser. and Econ. Dev., Atlas Sheet No. 40.

LONG, B. 1908. *Gymnadeniopsis nivea* in southern New Jersey. Torreya 8:16.

————. 1912. Some results of recent field work in the Cape May peninsula. Bartonia No. 4:14-19.

————. 1928. Some noteworthy indigenous species new to the Philadelphia area. Bartonia No. 10:30-52.

MINARD, J. P., W. W. HOLMAN, & A. R. JUMIKIS. 1954. Engineering soil survey of New Jersey. Report No. 15, Cape May County. Rutgers University, Engineering Research Bulletin 29:1-47.

MONTGOMERY, J. D. 1963. Flora of the Bennett Bog Wildlife Sanctuary. New Jersey Nature News 18:111-124.

————, & D. E. FAIRBROTHERS. 1963. A floristic comparison of two sphagnous wet lands in New Jersey. Bull. Torrey Bot. Club 90:87-99.

STONE, W. E. 1908a. Recent additions to our knowledge of the flora of southern New Jersey. Proc. Acad. Nat. Sci. Phila. 60:457-459.

Stone, W. E. 1908b. *Rynchospora rariflora* in southern New Jersey. Torreya 8:16-17.

————. 1910. New plants for southern New Jersey. Bartonia No. 2:26.

————. 1911. Plants of southern New Jersey, with especial reference to the flora of the Pine Barrens. New Jersey St. Mus. Ann. Rep. 1910. pp. 25-828.

Stone, W., A. N. Leeds, & B. Long. 1914. Abstract of the Proc. of the Phila. Bot. Club for 1913. Bartonia No. 6:21-27.

Tedrow, J. C. F. 1962. Soils of New Jersey. New Jersey Agr. Exp. Sta., 1 sheet.

U.S. Department of Agriculture. 1941. Climate and man. Yearbook of Agriculture. U.S. Government Printing Office, Washington, D.C., 1248 pp.

U.S. Weather Bureau. 1964. Climatography of the United States. Decennial census of the United States Climate. Climatic summary of the United States, supplement for 1951-1960. New Jersey. U.S. Dept. Commerce, No. 86-24, 35 pp.

Wherry, E. T. 1954. Bennett Bog now a nature sanctuary. Bartonia No. 28:36-37.

Widmer, K. 1964. The geology and geography of New Jersey. D. Van Nostrand Company, Inc., Princeton, New Jersey, New Jersey Historical Ser. 19:1-193.

Wolfe, P. E. 1953. Periglacial frost-thaw basins in New Jersey. Jour. Geol. 61:133-141.

————. 1956. Pleistocene-periglacial frost-thaw phenomena in New Jersey. Transactions New York Acad. Sci., Ser. 2, 18:507-515.

GENERAL LIMIT
OF INFESTATION
AREAS ON WHICH CHLORIS
PLANTS WERE OBSERVED
0
1200 FEET
ROUTE 420
SHAWNEE
CHIPPEWA
DELAWARE
MOHICAN
PONTIAC
SENECA
WYANDOTTE
OSCEOLA
POWHATTAN
2ND AVE
3RD
4TH AVE
5TH AVE
ST.
AVE
DELAWARE
SAUD
BARTRAM
JANSEN
EDGEMONT
WANAMAKER
CENTER
INDUSTRIAL HIGHWAY RTE 291
PRINTZ
LEGRANGE
CARRE
SAUD
BARTRAM
3 RD ST.
2 ND ST.
N
676
Philadelphia
Camden
76
13
695
291
420
Tinicum Marsh
95
Phila. Arprt.
RIVER
DELAWARE
Map Area
295

FIGURE 1.—Area of *Chloris verticillata* infestation in Tinicum Township, Delaware County, Pennsylvania, during 1969. Inset map shows relation of area to Tinicum Marsh and the City of Philadelphia.

Windmill Grass (*Chloris verticillata* Nuttall) in Pennsylvania

JACK MCCORMICK, DAVID HARPER, LESLIE JONES

AND

WESLEY MURRAY

Waterloo Mills Research Station, Devon, Penna. 19333

Chloris verticillata Nuttall, a grass native to the southwestern United States (Hitchcock and Chase, 1951) is well established in Essington, Tinicum Township, Delaware County, and occurs in a small, isolated stand on the Waterloo Mills Research Station at Devon, Easttown Township, Chester County, Pennsylvania.

Two other species of *Chloris* have been collected previously in the Philadelphia area, but apparently have not persisted. In the herbaria of the University of Pennsylvania and The Academy of Natural Sciences of Philadelphia there are specimens of *Chloris petraea* (1865) and *C. virgata* (1942). Mr. Louis Hand collected *Chloris verticillata* in 1948 in the town of Island Heights, about 2.5 miles east of Tom's River, Ocean County, New Jersey (ANSP 115). The species was persisting at this station in 1970. During 1968, Mr. Hand found *Chloris verticillata* in Collingswood, Camden County, New Jersey. "The plant is abundant on sandy lawns and strips between sidewalks and curbs for several blocks" in one place and occurs at two or more other sites in the locality (Personal communications, Louis Hand, 1969, 1970).

In Tinicum Township windmill grass first was noticed in 1968 as scattered plants in an old field south of Tinicum Marsh, the tidal section of Darby Creek above its confluence with the Delaware River. Specimens were collected as part of a study of the flora and vegetation of Tinicum Marsh, but identification was delayed until winter. After the collection was realized to be unique, a special exploration of the area was made during the summer of 1969. This survey revealed that the species has become established as a lawn weed in an area of approximately 0.7 square mile. In association, crabgrass (*Digitaria sanguinalis*) and windmill grass form the bulk of the vegetation of many lawns in this locality. The area of observed infestation (Figure 1) extends from Tinicum Marsh southward to 2nd Street. On the west the area is bounded by Wanamaker Avenue (State Route 420) and on the east by 4th Avenue.

Windmill grass was found in fruit in Easttown Township during October 1969 on a northeast facing hilltop at the Waterloo Mills Field Research Station. About 50 plants were noticed in four discrete areas of shallow soils adjacent to outcrops of the Wissahickon schist bedrock. (Specimens have been deposited in the herbarium of The Academy of Natural Sciences). Although it seems unlikely, the Waterloo Mills plants of windmill grass may have developed from seeds introduced accidently from Tinicum Township.

Residents in Tinicum Township confuse windmill grass with crabgrass and were not able to recall when the plant became established in the Township. The mechanism of introduction is unknown, but Pohl (1959) recorded that seeds of *Chloris verticillata* were found occasionally in lawn seed mixtures brought into Iowa. According to Wendell P. Ditmer, Seed Program Supervisor, Bureau of Plant Industry, Pennsylvania Department of Agriculture (Personal communication, 1969), *Chloris verticillata* has never been observed in any lawn grass mixtures that are offered for sale in Pennsylvania. Mr. Ditmer suggested that windmill grass might have been introduced with plugs or stolons of Bermuda grass or Zoysia grass. Vegetative propugles are not subject to inspection by his laboratory. No area in which these species have been planted, however, is known in Tinicum Township.

Literature Cited

Hitchcock, A. S., & A. Chase. 1951. Manual of the grasses of the United States. U.S. Dept. Agric. Misc. Publ. 200. 1051 pp.

Pohl, R. W. 1959. Introduced weedy grasses in Iowa. Iowa Acad. Sci. Proc. 66:160-162.

A New Botanist at the Academy

In February of 1970, Dr. James A. Mears joined the staff of the Academy of Natural Sciences as Assistant Curator of Botany and Director of the newly established Phytochemical Laboratory.

Dr. Mears received his B.A. from the University of Texas at Austin with majors in chemistry and mathematics, and minors in physics and biology. In May, 1970, he was awarded a Ph.D. in Molecular Biology (Phytochemical Systematics) by the University of Texas.

The major field of Dr. Mears' research is molecular evolution: how chemical components differ among related species and how they are modified through time. Since coming to the Academy, his special area of interest has centered on the study of the morphology, cytology and chemistry of *Parthenium* spp. (Compositae). He has been studying, in particular, speciation, endemism and hybridization in the approximately 20 taxa in this genus. Dr. Mears is also working toward a revision of the Gomphrenoideae, a subfamily of the Amaranthaceae; this is expected to be a long term project.

Although most of Dr. Mears' present work concerns Southwest United States and Mexican species of *Parthenium*, he also plans to do some biochemical work on local species.

At 73

No. 41 1971-1972

BARTONIA

JOURNAL OF THE PHILADELPHIA BOTANICAL CLUB

CONTENTS

Walter MacKinnett Benner (1888-1970) .... MARIAN R. ROBERTSON 1

The Past and Present Flora and Vegetation of the Hackensack Meadows WILLIAM S. SIPPLE 4

Morphological and Anatomical Differences in Leaf Blades of Three North American Aquatic Bulrushes (Cyperaceae: *Scirpus*) .... ALFRED E. SCHUYLER 57

Marsilea quadrifolia L. in Delaware County, Pennsylvania FLORENCE M. GIVENS AND WAYNE FERREN 60

Phylogenetic, Biochemical, and Morphological Studies With Some Living Specimens of Naturally Extinct or Relictual *Styrax* Species .... JAMES A. MEARS 61

Arethusa bulbosa forma *albiflora* at Quaker Bridge, New Jersey .... WILLIAM S. SIPPLE 70

A Check-list of the Flora of Montgomery County, Pennsylvania .... EDGAR T. WHERRY 71

Rumex hastatulus, A New Delaware County Taxon .... EDGAR T. WHERRY 84

Program of Meetings and Trips of the Philadelphia Botanical Club .... *Inside Back Cover*

PUBLISHED BY THE CLUB

ACADEMY OF NATURAL SCIENCES, 19TH & PARKWAY

PHILADELPHIA, PENNSYLVANIA 19103

Subscription Price, $2.00 Back Numbers, $2.00 each.

ISSUED DECEMBER 22, 1972

MISSOURI BOTANICAL

JAN 22 1973

GARDEN LIBRARY

The Philadelphia Botanical Club, 1971-1972

Editor: Alfred E. Schuyler

Managing Editor: Barbara R. Jones

Members of the Editorial Board

Ralph E. Good
James C. Hickman
Hui-Lin Li
Ronald L. Stuckey

Officers of the Philadelphia Botanical Club for 1971-1972

Honorary President: Edgar T. Wherry
Vice President: Alfred E. Schuyler
Treasurer: William L. Freyburger 1971
John F. Gyer 1972
President: Ralph M. Sargent
Secretary: Julia E. Moore
Curator: John M. Fogg, Jr.

Dedicated to the memory of
Dr. Walter MacKinnett Benner

BARTONIA

JOURNAL OF THE
PHILADELPHIA BOTANICAL CLUB

NO. 41 **1971-1972**

Walter MacKinnett Benner (1888-1970)

MARIAN R. ROBERTSON
Moorestown, New Jersey

Walter MacKinnett Benner was born on December 16, 1888 in Souderton, Montgomery County, Pennsylvania. On December 26, 1912, he became a member of the Philadelphia Botanical Club. He obtained his Bachelor of Science degree from Muhlenberg College in 1920. In 1925 he married Edna Eleanor Cullen and settled at 5636 Loretta Ave., Frankford, in the northeast part of Philadelphia. During this same year he began teaching biology at Central High School, where he worked until his retirement in 1954.

He received his Masters degree from the University of Pennsylvania in 1926, where he was one of the more promising students of Dr. John M. Macfarlane. In January 1928, he was elected president of the Philadelphia Botanical Club and served in this office until succeeded by Dr. Edgar T. Wherry in 1932. Also during this year he became Research Associate in Botany at the Academy of Natural Sciences of Philadelphia. In partial fulfilment of his Ph.D. from the University of Pennsylvania in 1931, he compiled the Flora of Bucks County, Pennsylvania, which he published in 1932. From December 1958 until September 1962, he was Acting Chairman of the Department of Botany at the Academy of Natural Sciences and from September 1962 until June 1967 he was a Scientific Assistant in the same department. He again served as president of the Philadelphia Botanical Club from January 1962 until December 1967. The effects of Parkinson's Disease caused his knees to become increasingly uncertain, but he managed to attend a few botanical club meetings after this. He died Thursday, December 31, 1970, at the age of 82, at All Saints' Hospital, Chestnut Hill.

Dr. Benner's botanical interests centered around the flora of Bucks County, Pennsylvania, the taxonomy of the genus *Lycopus,* the work of local botanists, and the curating of botanical collections housed at the Academy of Natural

Sciences. Soon after joining the Philadelphia Botanical Club, he reported *Salvia verticillata* at Sellersville, Pennsylvania, and *Salvia sylvestris* near Penllyn, Pennsylvania, in the 1913 issue of *Bartonia.* By 1922, he had "commenced the collecting of data, both specimens in the field, and locality records from the Club's Herbarium, for a detailed flora of Bucks County, Pennsylvania," (*Bartonia* 14:61). After the publication of his Bucks County flora in 1932, Dr. Benner continued to publish additions to the flora in *Bartonia.* During the summer of 1929, he studied the genus *Lycopus* with Professor Wiegand at Cornell University. Subsequently he published papers dealing with the taxonomy of this genus in the 1934 issue of *Bartonia.* His interest in the work of local botanists was reflected in the obituaries he published in *Bartonia:* Eugene A. Rau (1933), Otway H. Brown (with Dr. Pennell in 1947), Lee Sowden (1949), Francis W. Pennell (1952), and Morris E. Leeds (1952).

Dr. Benner's work with the botanical collections housed at the Academy of Natural Sciences was widely known and appreciated by botanists. From the day he began helping Mr. Long with the care of the Botanical Club's herbarium in 1922 until he left the Academy in 1967, he put in many hours of dedicated work on the many aspects of the Academy's botanical collections. The 1928 issue of *Bartonia* states that he "has been giving a large portion of his time to assisting Mr. Bayard Long in curatorial work." The 1931 issue states: "The largest recent accessions of specimens have come from Walter M. Benner, Hans Wilkens, Hugh E. Stone, and Dr. John M. Fogg, Jr. During the year there has been considerable progress in comparing, mounting and incorporating the large series of local collections made by the Club's Curator. Both Mr. Long and Dr. Benner have been engaged on these throughout the year." The spring of 1937 must have been an exceptionally busy time for him as this was when the Academy's herbaria were moved to and consolidated in their present location in the top floor of the middle wing (*Bartonia* 19:59). Again, in the 1944-1945 issue of *Bartonia* Dr. Benner's work in the herbarium was acknowledged, "Since 1922 Dr. Walter M. Benner . . . has assisted Mr. Long in caring for the Local Herbarium."

Beginning in October, 1927, when he spoke to the Botanical Club on "Plant Areas in Bucks County," Dr. Benner's Botanical Club lectures were well-attended. In May, 1935, he spoke on "The Genus *Lycopus;*" in November, 1936, he and Mr. Long discussed "Recent Explorations in Hunterdon County, New Jersey;" in May, 1939, the topic was "North to Nain — 1936;" and in October, 1947, it was "Local Species of *Eupatorium.*"

Those of us who worked with Dr. Benner during his later years in the Academy Herbarium remember his friendly approach with everyone, his sense of humor, and his affection and dedication toward the Academy. His anecdotes about his experiences and travels were enjoyed by friends and colleagues. Frequently he brought in newspaper clippings which had bearing on the interests of staff members or were humorous and appealed to everybody. His enthusiasm for acquainting people with the botanical collections, as well as helping scientists use and appreciate them, was always apparent. He cherished the priceless Academy collections and conveyed a feeling of reverence toward them to others. Despite ill health and the inconvenience of commuting, he continued to work in the Academy Herbarium until his 78th year, thus contributing a substantial portion of his life to its well-being.

Dr. Benner became a member of the Frankford Historical Society in 1936 and at various times had been its director, vice-president, and president. He also lectured and published articles about Frankford history. He was a Mason and a member of St. Marks Episcopal Church, Frankford.

Plants named after Dr. Benner were *Panicum benneri* Fernald and *Rubus benneri* Bailey.

Walter MacKinnett Benner (1888-1970)

The Past and Present Flora and Vegetation of the Hackensack Meadows[1]

WILLIAM S. SIPPLE

Maryland Department of Natural Resources

INTRODUCTION

The Hackensack Meadows is located in the Triassic Lowlands, a subdivision of the Piedmont Province in Northeastern New Jersey. Elevations range from zero to ten feet, with most areas being less than five feet above sea level. Elevations higher than ten feet occur in restricted areas.

The New Jersey Division of State and Regional Planning considers the Hackensack Meadows to consist of 18,000 acres occurring along the Hackensack River in northeastern New Jersey (see fold-out map). The area of this study includes the above 18,000 acres, but extends additionally into Little Ferry, Secaucus, and Communipaw. Located in Bergen and Hudson Counties, the Hackensack Meadows is bounded on the north approximately by State Route 46, on the south by the confluence of the Passaic and the Hackensack Rivers, on the east by State Route 9, and on the west by State Route 17. It is centered at longitude 74° 04′ W and latitude 40° 49′ N.

The area is predominantly tidal marsh and the soils are comprised mostly of peat or muck. Mineral soils (limited in distribution) occur on the higher sites where stratified drift and glacial clays of the ancient Glacial Lake Hackensack are exposed. These varved clays represent a continuous series of 2,550 varves representing many years of deposition in the Hackensack Valley (Reeds, 1927). The clays lie upon sedimentary rocks of Triassic age classed as the Newark series (Schuberth, 1968). Diabase intrusives of the Newark series (Triassic age) are exposed in two areas in the Meadows — Snake (Laurel) and Little Snake Hills.

The objective of this report is to describe the past and present flora and vegetation of the Hackensack Meadows. Field work was done in the study area during September, 1969. Data from the field work were then correlated with patterns of apparent vegetation types appearing on aerial photographs taken in June, 1969. The vegetation map was then drawn to a scale of 1:24000 on the basis of these data and correlations. Additional field work was done in the spring and summer of 1970 to more accurately describe the vegetation types and check the mapping. Voucher specimens for most of the encountered species have been deposited in the herbarium of the Academy of Natural Sciences of Philadelphia. A list of the species encountered and/or collected is given in Table 1. Nomenclature in most instances follows Fernald (1950).

In reconstructing the past vegetation of the Hackensack Meadows, five main publications were consulted (Torrey, 1819; Britton, 1889; Heusser, 1949 and

---

[1] Portion of a thesis (Sipple, 1971) submitted in partial fulfillment of the requirements for the degree of Master of Regional Planning in the Department of Landscape Architecture and Regional Planning at the University of Pennsylvania, Philadelphia.

1963; and Harshberger and Burns, 1919). Vermeule's map (1896) was also examined.

One of the problems encountered in working with the older publications was that some of the locality names have changed subsequent to the time of publication and differ from those on current U.S. Geological Survey topographic maps (Weehawken, 1967; Jersey City, 1967) which have been used for place names in this study. In this report, Manhattanville refers to the borough of Manhattan, Weehawk to Weehawken, and Elizabethtown to Elizabeth. Vermeule's map, as modified in Figure 1, shows the approximate location of some of these localities in the Meadows.

Another problem was that of nomenclature. Consequently, the species lists in this report (Torrey, 1819; Britton, 1889; Harshberger and Burns, 1919; and Heusser, 1949) contained currently unfamiliar nomenclature. It was necessary to bring this nomenclature up to date, at least to a standard (Fernald, 1950).

Lists have been included (Tables 3, 4, 5, and 6) to indicate the species collected in the Hackensack Meadows and surrounding areas. The lists from Britton and Torrey were taken from general floras. (*Catalogue of Plants Found in New Jersey* and *A Catalogue of Plants Growing Spontaneously within Thirty Miles of New-York*). Publications of Burns (1919) and Heusser (1949) contain lists specific to the Hackensack Meadows. Heusser's list (1949) and Burns' list (1919) were compiled from their own field work, so the plants they indicated were essentially contemporaneous with the date of publication. However, Britton (1889) cited species from herbarium collections, but did state that many species in his flora were from recent collections. Dates of collection in Torrey's publication were not given; thus, many of the species listed by Torrey (1819) could have been collected at a much earlier date. Furthermore, the extent of many of the species listed by Torrey, Britton, and Burns in 1819, 1889, and 1919, respectively, is not completely known for the Meadows, because there was a lack of notation on collecting areas. Probably only selected locations were botanized. However, Vermeule's map does indicate the extent of the existing cedar swamp (and acreage) in 1896 (Fig. 1). Vermeule also delineated areas as "cedar swamp bottom" that contained the remains of dead cedars which gives an indication of the extent of the cedar swamp prior to 1896. Collection localities for species reported by Torrey (1819), Britton (1889), Harshberger and Burns (1919), and Heusser (1949) have been indicated (Fig. 1). Since some of the species were reported by 19th century botanists, the author examined their collections preserved at the New York Botanical Garden. Specimens of about 25 species were found that were collected from the Meadows during the nineteenth century including some original specimens from the Torrey collection such as *Coptis groenlandica*. All of those examined (Table 2) appeared to be identified correctly except for a doubtful specimen of *Xyris flexuosa* and three doubtful specimens of *Rubus pubescens*.

PRESENT FLORA AND VEGETATION

Nineteen vegetation types are described and grouped into four general categories: marshes, forested areas, meadows, and ruderal plants.

Marshes

1. *Phragmites australis* (Reed-Grass) Type: This vegetation type is ubiquitous in the area. It is the most common vegetation type found and, because of its density and height, travel through it is difficult. Its great abundance is evident on the accompanying vegetation map. These plants usually have seed-less spikelets and reproduce chiefly by vegetative means. Surface runners up to 4.5 meters in length have been seen in the Meadows. In many places *Phragmites australis* occurs in pure stands and in some areas it appears to be encroaching upon other vegetation types such as forested areas and ruderal fields. This encroachment too is evident where the salt marsh species are peripheral to the reed-grass. Higher elevations, such as dikes, also contain vegetation comprised almost entirely of the reed-grass. Some small upland areas, not necessarily marshes, are included within this type.

Other marsh areas scattered throughout the Meadows, although mapped as *Phragmites australis* due to its dominance, also contain salt marsh species and have been indicated on the vegetation map as areas "A", "B" and "C". Likewise a salt marsh species, *Spartina alterniflora,* has a discontinuous distribution along the Hackensack River in the study area. It is found in a strip up to about 7 meters in width and is associated with other halophytes. This is similarly true of many of the River's tributaries, such as Sawmill and Cromakill Creeks.

The salt marsh species observed for the entire Meadows include:

Amaranthus cannabinus
Aster subulatus
Distichlis spicata
Eleocharis parvula
Pluchea purpurascens
Salicornia europaea
Spartina alterniflora
S. patens
S. cynosuroides
Scirpus olneyi
Typha angustifolia

Although most of these species are found in salt marshes, some do occur under brackish or nearly fresh conditions (Fernald, 1950). Consequently, the areas of tidal influence, although containing some salt marsh species, could actually be brackish marsh. Data from Heusser (1949) and Potera (1970) indicate that brackish conditions exist. Heusser reported maximum salinities of 5.10, 6.95, and 20.75 percent of sea water for spring, summer and fall, respectively, in the Secaucus area, while Potera reported extremes of salinity of from 6.9 0/00 to 15.7 0/00 (parts per thousand) from Sawmill Creek area.

Area "A" is one of the better brackish marsh areas in the Meadows. Sawmill Creek passes through its entire length and supports scattered stands of *Spartina alterniflora* peripheral to the more dominant *Phragmites.*

Area "C" is similar to "A" but has a greater diversity of salt and brackish water species present. It is located above Bellman's Creek between the New Jersey Turnpike and the Hackensack River. Here are found:

Amaranthus cannabinus
Aster subulatus
Atriplex patula
Hibiscus sp.
Pluchea purpurascens
Scirpus olneyi
Spartina alterniflora
Spartina cynosuroides
Typha angustifolia

Spartina alterniflora, S. cynosuroides and *Typha angustifolia* occur in fairly large stands, but the other species are scattered. In most cases these are overtopped by the ubiquitous *Phragmites australis.* Viewed from the River, only the reed-grass can be seen, but, from the Interstate 95 bridge, stands of salt or brackish marsh plants are evident. Even on the upper reaches of Bellman's Creek, salt or brackish marsh species such as *Amaranthus cannabinus* and *Pluchea purpurascens* are present. *Spartina alterniflora*, however, is not present there.

Area "B" which lies to the south of area "C" is located between and around Cromakill and Mill Creeks near Secaucus. Here salt marsh and brackish marsh species are found, but these are hidden from view by the over-topping reed-grass. Heusser (1949) listed 117 species for this region. Many of the species listed by Heusser are reported to typically occur in salt or brackish marshes (Fernald, 1950), but, based upon Heusser's salinity studies, probably only brackish marsh was present. In field checking for the present study, the following species were found along Mill Ridge Road near the boatyard at Cromakill Creek:

Atriplex patula
Distichlis spicata
Juncus sp.
Pluchea purpurascens
Polygonum punctatum
Spartina patens
Scirpus americanus
S. olneyi
Solidago sempervirens

Near the Secaucus sewer plant (which is adjacent to area "B") clumps of *Typha angustifolia* and scattered specimens of *Amaranthus cannabinus* occur. Even the upper reaches of Cromakill Creek has stands of salt and brackish marsh species such as the following:

Amaranthus cannabinus
Hibiscus sp.
Pluchea purpurascens
Spartina cynosuroides
Typha angustifolia

On the west side of the River, along Berry Creek Canal, *Spartina alterniflora* is rare while *Phragmites australis* is found either in the water or along its edge. Where State Route 3 crosses Berry Creek, *Juncus* sp. is found as well as one plant of *Baccharis halimifolia,* infrequent plants of *Amaranthus cannabinus,* and *Pluchea purpurascens.* Farther upstream a large stand of *Typha angustifolia* exists. *Scirpus americanus, Spartina alterniflora* and *Pluchea purpurascens* are found also on Kinglands Creek. At the terminus of Plank Road on the west bank of the Hackensack River, a strip approximately seven meters wide with salt and brackish marsh species is present. This strip supports the following species:

Atriplex patula
Pluchea purpurascens
Solidago sempervirens
Spartina alterniflora
Typha angustifolia

One area, also along Plank Road in Carlstadt (a few hundred feet from State Route 20), is an open mud flat and supports *Typha latifolia.* One specimen of *Alisma subcordatum* was collected here. A salt or brackish marsh species, *Eleocharis parvula,* also occurs here. Another area just south of the junction of the Hackensack River and Interstate 95 contains such species as:

Aster subulatus
Amaranthus cannabinus
Atriplex patula
Hibiscus sp.
Pluchea purpurascens
Typha angustifolia

Salt or brackish marsh species likewise exist at other access points such as an area near Communipaw along the Hackensack River where the following are found:

Amaranthus cannabinus
Distichlis spicata
Juncus sp.
Solidago sempervirens
Spartina alterniflora

2. *Spartina alterniflora-Amaranthus cannabinus* Type: The larger of the two areas mapped under this category is a narrow strip occurring between Interstate 95 land-fill and a road dike to the west. This area was continuous with "A" (see fold-out map) before the construction of the highway, which now separates it from area "A". It is comprised almost entirely of *Spartina alterniflora* and *Amaranthus cannabinus* with the latter growing mostly along the watercourses. To the west of the dike and to the east of the road-fill, large open areas exist which are inundated at high tide but are exposed mud flats at low tide. *Phragmites australis* grows east of the inundated area. Many dead tree stumps are evident during low tide.

3. *Spartina patens-Atriplex patula-Salicornia europaea* Type: This is a small area, comprised mostly of these three species, that is located west of Little Snake Hill near the junction of the Penn Central and Erie-Lackawanna Railroads. This vegetation type, slowly being destroyed by sanitary land-fill operations, was probably of a larger extent prior to the filling.

4. *Typha angustifolia* Type: These areas are in many cases too small to be mapped and, therefore, are discussed above. However, there are some larger areas as indicated by the vegetation map. One such area is located along the Berry Creek Canal.

5. *Pluchea purpurascens* Type: Although this species is found frequently along the tributaries, it usually is too scattered to warrant mapping. However, in

some areas it is locally abundant or dominant and in at least one case was mapped. This area is found on the eastern edge of the Meadows near North Bergen. In most places it is usually associated with *Amaranthus cannabinus* or *Aster subulatus.*

Forested Areas

6. *Quercus palustris-Quercus bicolor-Acer rubrum* Type: Of the forested areas in the Hackensack Meadows, this type is the most frequent. However, the forested areas are small in number as well as in area and occur at Little Ferry, Moonachie, and in the vicinity of the Teterboro Airport. The forests in these localities are dominated by *Quercus palustris. Quercus bicolor* and *Acer rubrum* are also abundant. One such area west of the Losen Slofe Branch of the Hackensack River supports the following species of trees:

Acer rubrum
Betula populifolia
Liquidambar styraciflua
Populus grandidentata
Populus tremuloides
Prunus serotina
Quercus alba
Q. palustris
Q. rubra
Nyssa sylvatica
Sassafras albidum

The shrub layer is comprised of:

Cephalanthus occidentalis
Ilex verticillata
Pyrus melanocarpa
Rhododendron viscosum
Rhus copallina
Spiraea tomentosa
Vaccinium corymbosum
Viburnum dentatum

Of these shrubs *Pyrus melanocarpa* and *Vaccinium corymbosum* are the most abundant. They form a thicket type growth. Beneath this thick underbrush are found such plants as *Osmunda regalis* var. *spectabilis* and *Osmunda cinnamomea* as well as sphagnum moss. In 1919, cedar bogs existed in the northern part of the Meadows (Harshberger, 1919) and an 1896 map verifies their existence (Vermeule, 1897). This forested area could very well have been peripheral to such cedar bogs, much as deciduous swamps skirt around cedar bogs in the Pine Barrens of southern New Jersey today (McCormick, 1967). Species found common to both the Moonachie area and deciduous swamps in the Pine Barrens include:

Acer rubrum
Ilex verticillata
Iris prismatica
Hypericum canadense
Lilium superbum
Ludwigia alternifolia
Nyssa sylvatica
Osmunda cinnamomea
O. regalis var. *spectabilis*
Pyrus melanocarpa
Rhexia virginica
Rhododendron viscosum
Vaccinium corymbosum

On the periphery of the forested area are also found *Andropogon virginicus* var. *abbreviatus, Onoclea sensibilis, Solidago graminifolia, Hypericum mutilum, Polygala sanguinea,* and *Thalictrum polygamum.*

Another forested area examined is off Moonachie Road about one mile from State Route 17. The following trees occur:

Acer rubrum
Liquidambar styraciflua
Nyssa sylvatica
Quercus palustris
Q. rubra

The shrub layer is comprised of:

Clethra alnifolia
Pyrus melanocarpa
Vaccinium corymbosum
Viburnum dentatum

Osmunda cinnamomea, Woodwardia areolata, Maianthemum canadense, and *Uvularia sessilifolia* represent the herb layer in the spring and early summer.

In Little Ferry there is a large forested area between Eckeland and Mehrhof Roads that is dominated by *Quercus palustris* and *Q. bicolor.* It has an understory shrub layer comprised mainly of *Clethra alnifolia* and *Pyrus melanocarpa.* The following herbaceous plants are present:

Bartonia virginica
Dennstaedtia punctilobula
Hypericum canadense
Juncus marginatus
Lilium superbum
Lysimachia terrestris
Polygala sanguinea
Pteridium aquilinum
Rhynchospora chalarocephala
Scirpus cyperinus
Woodwardia areolata

Another native forested area dominated by *Quercus palustris* is found at Secaucus off Mill Ridge Road. It contains other tree species such as *Acer rubrum, Carya* sp., *Liquidambar styraciflua, Prunus serotina, Quercus bicolor,* and *Ulmus americana.* The most abundant shrub is *Viburnum dentatum,* but *Sambucus canadensis* is frequent on the periphery. Other species found include *Dryopteris noveboracensis, Impatiens capensis, Juncus tenuis, Maianthemum canadense, Polygonum cespitosum,* and *Uvularia sessilifolia.*

A very small area, lying next to Interstate 95 and adjacent to the road dike running from Plank Road to the Hackensack River, contains fourteen standing red maples (*Acer rubrum*) twelve of which appear to be dead. Beneath the maples *Pluchea purpurascens* and *Cyperus strigosus* are found on the wetter sites while ruderal plants are found in drier areas.

7. *Quercus-Carya* Type: In the southern part of the Meadows two areas of this upland forest type are found. These forests occur on Snake (Laurel) and Little Snake Hills. Another occurs at Secaucus. Prior to quarrying, Snake Hill supported many trees, but now only a narrow strip of trees along the New Jersey Turnpike remains. Even though Little Snake Hill is being encroached upon by sanitary land-fill, it is still covered with a mixture of trees and herbs. Most of the woody plants are scattered and are small relative to the other forested

areas (trees up to six meters). The trees and shrubs consist of:

Betula populifolia
B. lenta
Carya sp.
Celtis occidentalis
Hamamelis virginiana
Nyssa sylvatica
Prunus serotina
Quercus prinus
Quercus rubra
Q. stellata
Rhus copallina
R. glabra
R. typhina
Rubus sp.
Sassafras albidum

Of these species, *Quercus prinus* and *Quercus rubra* are the most abundant. As opposed to other natural forested areas in the Meadows, *Quercus palustris* is not present on either Snake (Laurel) or Little Snake Hills. The dominant herbs are *Andropogon scoparius, Sorghastrum nutans* and *Deschampsia caespitosa.* The following also occur:

Apocynum sp.
Asclepias tuberosa
Calamagrostis canadensis
Dennstaedtia punctilobula
Erechtites hieracifolia
Panicum virgatum
Poa sp.
Phytolacca americana
Scrophularia lanceolata

8. *Ailanthus altissima* Type: Although these forested areas are dominated by *Ailanthus altissima,* they contain in most instances an understory of ruderal plants. A good example of such an area is found along Secaucus Road.

9. Herb-Shrub Thicket: Almost all the areas mapped as Herb-Shrub Thicket occur in the vicinity of Teterboro Airport adjacent to forested areas and appear to be in various stages of succession from old field to forest. Some of these are cut-over areas. One large area also occurs in the southern part of the Meadows adjacent to Snake Hill.

Meadows

10. *Andropogon virginicus* Type: Although species of this genus are found frequently on dry sites throughout the Meadows, there are only two localities where they are abundant enough to be considered a vegetation type. One is a small area near the edge of the Meadows at North Bergen and the other is a larger area near Snake Hill. The dominant grass is *Andropogon virginicus,* but in some instances *Andropogon scoparius* also occurs.

11. *Panicum virgatum* Type: There are only three areas mapped under this vegetation type. One is in the northern part of the Meadows on the west side of the Hackensack River. The second is in the Little Ferry-Moonachie area and the third occurs along the Erie-Lackawanna Railroad near Little Snake and Snake Hills. This plant also occurs elsewhere in the meadows on dry sites but is not dominant.

12. *Panicum virgatum*-Ruderal Species: One locality was mapped under this

category; it occurs at Moonachie. The most common ruderals are *Helianthus annuus, Asclepias syriaca,* and *Artemisia vulgaris.*

13. *Panicum virgatum-Solidago* Type: This vegetation type is comprised almost completely of *Panicum virgatum* and species of *Solidago.* It occurs only at one locality near Moonachie.

14. *Panicum virgatum-Calamagrostis canadensis* Type: This vegetation type occurs in only one area (at Moonachie near the terminus of Moonachie Avenue) and contains certain native species not observed elsewhere. Some of these restricted species are *Iris prismatica, Lilium superbum, Spiraea latifolia,* and *S. tomentosa.*

15. *Solidago* Type: Only one locality was found to support this vegetation type. It is a small area in Moonachie at the terminus of Moonachie Avenue. It is comprised almost entirely of *Solidago* species along with a few ruderal plants, such as *Helianthus annuus.*

Ruderal Plants

This category contains some of the more common species of plants in the Hackensack Meadows. While ruderal plants usually refer to those plants commonly found growing on disturbed areas which were previously occupied by native species, in this report areas so mapped refer to vegetation consisting of only herbaceous ruderal plants such as those occurring in vacant lots, along transportation routes, land-fill areas, utility lines, and other areas where the ground has been disturbed. In fact almost all of these plants occur on old land-fills and along roadsides throughout the Meadows. However, many of these highly disturbed areas are not large enough to warrant mapping.

16. Ruderal Species: This category is the most common of the ruderal plant areas. Its composition varies somewhat in different areas. For example, one such area along Plank Road between Route 20 and the Hackensack River consists, almost entirely, of *Artemisia vulgaris.* Another area at the terminus of Plank Road consists of the following species:

Arctium minus
Artemisia vulgaris
Chenopodium album
Daucus carota
Helianthus annuus
Lepidium virginicum
Melilotus alba
Panicum dichotomiflorum
Polygonum cuspidatum
Setaria faberi

Some trees and shrubs occur too, such as:

Ailanthus altissima
Betula populifolia
Prunus serotina
Robinia pseudo-acacia
Salix nigra
Viburnum recognitum

South of Secaucus on County Road the following ruderal species occur:

Asclepias syriaca
Aster pilosus
Daucus carota
Erechtites hieracifolia
Helianthus annuus
Humulus japonicus
Melilotus alba

At Communipaw on the banks of the Hackensack River nineteen such species are found:

Ambrosia artemisiifolia
Artemisia vulgaris
Chenopodium album
Daucus carota
Digitaria sanguinalis
Eleusine indica
Erigeron canadensis
Euphorbia supina
Helianthus annuus
Lepidium virginicum
Melilotus alba
Panicum dichotomiflorum
Petunia violacea
Phytolacca americana
Polygonum cuspidatum
Potentilla canadensis
Setaria faberi
Triodia flava
Verbascum thapsus

Others, not usually considered ruderals, are also found:

Oenothera biennis
Panicum virgatum
Rubus sp.
Solidago altissima
Verbena urticifolia

These lists are not complete, but they do give an indication of the major species occurring in areas mapped as ruderal species.

17. Ruderal Species-*Phragmites australis*: Ten areas in the Meadows are included in this category. The majority are found in the Little Ferry-Teterboro Airport area. Other such areas are found in the southern part of the Meadows, the largest occurring south of Exchange 16 of the New Jersey Turnpike. These areas contain *Phragmites australis* and many of the ruderals indicated above.

18. Ruderal Species-*Phragmites australis*-Shrub: Only one area under this category exists in the Meadows. It occurs along the Belleview Turnpike near Schuyler's Corner. While it contains *Phragmites australis* and some of the ruderals listed under category 16, in addition it contains scattered shrubs and small trees such as *Prunus serotina.*

19. Ruderal Species-Scattered Trees: Only one area under this category exists in the Meadows. It is located along County Road across from the Croxton Railroad Yards. It contains many ruderals as well as scattered trees such as *Prunus serotina* and *Ailanthus altissima.*

Past Flora and Vegetation

During the Wisconsin glaciation, the area north of the terminal moraine in northern New Jersey, including the present area of the Hackensack Meadows, was covered with ice. However, with the retreat of the glacier, the area now considered the Hackensack Meadows was occupied by a large glacial lake (Glacial Lake Hackensack) that was supplied with melt-water from the retreating glacier. During the existence of this lake much sedimentation took place to form the present thick accumulation of varved clays. Based upon varve counts, this accumulation seems to have taken place over a 2,500 to 3,000 year period (Antevs, 1928). For some reason, possibly due to isostatic adjustment after the glacial retreat, the lake drained. Furthermore, with the melting of the glaciers during this period, there was a concomitant rise in sea level with encroachment of waters into the Meadows culminating in a favorable environment for the post-Wisconsin marsh formation in the lower Hackensack River Valley.

Pollen and Peat Samples

The pollen studies of Heusser (1949, 1963) for the Secaucus area indicated that an angiospermous swamp dominated by *Fraxinus nigra* probably was the first plant association to become established after the lake drained, although other vegetation might have preceded it and not left a record. The swamp peat was overlain by peat composed of a mixture of the above species as well as two typically northern bog species (*Larix laricina* and *Picea mariana*). An absence of ash was reported at about seven feet but the two northern species increased. Heusser's data indicated that a southern bog composed of *Chamaecyparis thyoides* followed the bog dominated by northern species. This cedar bog peat was in turn encroached upon on its periphery by a layer of marsh peat composed largely of *Scirpus olneyi, Juncus gerardi,* and *Typha angustifolia,* all either salt or brackish marsh species. This entire sequence, *Fraxinus nigra* to salt or brackish marsh species, represents great change for the Secaucus area and quite possibly even the entire Hackensack Meadows.

Heusser's 1963 profiles were obtained from Secaucus, East Rutherford and Kearny. *Chamaecyparis thyoides* pollen as well as wood was found only on the upper part of the Secaucus bog, thus indicating a late migration of this species into the area — perhaps 500 years ago. The presence of this species in southern New Jersey at a much earlier date was demonstrated by the report of trees of 6′ dbh and with 1,000 annual rings in bog excavations there (Gifford, 1895). It became established in Cheesequake tidal marsh (northeastern New Jersey) about 1,800 years ago (Rosenwinkel, 1964). Evidently the climate was milder in the more southern coastal areas of New Jersey at this time. Thus the Hackensack Meadows probably had cedar bogs at least 500 years ago, and these were still extensive in 1896 when Vermeule mapped the area.

Hackensack Meadows — 1819

"Perhaps there is no region more interesting to the botanist nor to the geologist than that which surrounds the City of New-York." This statement by John Torrey (1819) expresses how diverse the area must have been in contrast to the way it is today. Torrey went on to say: "Few places have afforded us more plants, than the vicinity of Hoboken and Weehawk, and the neighboring marshes. Many excursions have been made to these places, but much remains to be discovered. The cedar swamp, near New Durham, is particularly deserving of notice. This is a sphagnous morass, of about three quarters of a mile in length, and between two and three hundred yards wide, and is entirely overgrown with the *cupressus thuyoides* or white cedar, and other evergreens. Many of our most rare and interesting plants were obtained in this place, as our catalogue bears evidence."

Table 3, which contains species listed by Torrey in 1819 for the Hackensack Meadows and vicinity, gives a concept of how diverse the past flora was. For example, at Manhattanville such species as *Tsuga canadensis* and *Viburnum alnifolium* occurred. Across the river at Weehawk, northern species such as *Coptis groenlandica* and *Cypripedium reginae* as well as typically cedar bog species like *Sarracenia purpurea, Hypericum denticulatum, Carex collinsii* and *Arethusa bulbosa* were reported. South of Weehawk at Hoboken many species were found as indicated under the list for Hoboken and/or Greenwich in which contains 88 species. Also included in Table 3 are species collected from Elizabethtown and the Newark Meadows.

Torrey listed collection sites (Table 3) within the Hackensack Meadows such as the New Durham cedar swamp where the following northern bog species were reported:

Calla palustris
Eriophorum tenellum
Larix laricina
Listera convallarioides
Picea mariana
Vaccinium oxycoccos

He also reported *Drosera rotundifolia* and *Sarracenia purpurea* as well as two species typically found in northern forests, *Trientalis borealis* and *Cornus canadensis*. *Drosera rotundifolia* and *Sarracenia purpurea* are also found in southern bogs, but Transeau (1903) considered them typical northern bog species. Another species found at New Durham, *Aster nemoralis*, is similarly a typical northern bog species, although this plant presently occurs in the New Jersey Pine Barrens and has been reported from Delaware by Fernald (1950).

Today, citations such as the above (except *A. nemoralis, D. rotundifolia, S. purpurea*, and *T. borealis*) are not reported from the coastal plain in New Jersey, and in 1919 Burns reported Meadows collections for only two of those mentioned by Torrey. Stone (1911) considered the Hackensack Meadows as being a part of his Middle District which included southwestern New Jersey as well as an extension southeast of the fall-line into the northeastern part of the state including Staten Island and the Hackensack Meadows. Stone's data indicated that northern plants were probably few in numbers in the Hackensack Meadows area, or else he would have placed the area in a different district.

Southern bog species listed as being collected in the New Durham cedar swamp included:

Chamaecyparis thyoides
Drosera intermedia
Habenaria cristata
Ilex ambigua
I. glabra

Some of these also occur in northern bogs, but two (*Ilex ambigua* and *Habenaria cristata*) are strictly southern species. If *Ilex ambigua* was identified correctly, it would be quite an exception since it is not even mentioned as occurring in New

Jersey by Fernald (1950), Robinson and Fernald (1908) or even Gray (1856). However, *Ilex verticillata* and *I. laevigata* are very similar to *Ilex ambigua* and could have been misidentified for it.

In addition, other southern bog species were reported from the Hackensack Meadows such as *Orontium aquaticum* from Bergen and *Xyris caroliniana* from the area in general. Furthermore, many species were reported from the New Jersey area in general (but within 30 miles of New York) and these could have been collected in the Meadows.

No salt or brackish marsh species were reported other than *Sabatia dodecandra.* Likewise, the presently ubiquitous *Phragmites australis* was not yet reported from the Meadows although it could have been present at the time because it was reported from Elizabethtown. *Zizania aquatica* was reported although it is absent from the Meadows today.

The conclusion is that a large cedar swamp was present prior to and in 1819. Since Torrey stated that the cedar swamp was near New Durham, it could have been the same area delineated by Vermeule for the Secaucus area in 1896: the descriptions match, even though Vermeule's map lists Secaucus and New Durham as separate places. Heusser (1949) suggests the area at Secaucus was known to botanists as the New Durham cedar swamp. If this is true then the cedar swamp probably did not change greatly between these two periods.

Undoubtedly, other freshwater areas were in existence within the Meadows at this time because representative species were reported. However, it is doubtful that much, if any, salt or brackish marsh was present because only *Sabatia dodecandra* was collected and this species is found also in freshwater marshes. The possibility exists that such marshes were present, but were not botanized.

Hackensack Meadows — 1889

When Britton compiled his flora in 1889, the extent of the cedar swamp probably had not changed appreciably from the time Torrey studied the flora in 1819 since Torrey's description of the area is very similar to that of Vermeule in 1896. However, the precise extent of the cedar bogs in the Meadows could have been different and the composition could have changed. Furthermore, it is difficult to compare Torrey's data with Vermeule's map since Torrey spoke little of areas other than New Durham. For example, Torrey listed only four collection localities in the Meadows while Britton listed ten. This dearth of localities probably reflects localized collection (or a lack of it) rather than a lack of good collecting areas. Torrey (1819) listed eight northern bog species for New Durham and two southern bog species while Britton (1889) lists seven northern bog species and three southern bog species (Tables 3 and 4).

Southern species in this paper refer to those species found usually on the coastal plain and reaching their northern-most distribution in many instances in southern New Jersey or extending up the coastal plain to Staten Island, Massachusetts, or Rhode Island. Northern species on the other hand are typically found in northeastern U.S. and adjacent Canada and south only to northern New Jersey and Pennsylvania or only in mountainous areas further south of their northern range (Fernald, 1950). The entire area contained three southern citations (3 species) and ten northern citations (10 species) in Torrey's data (Table 3). Britton's data, however, contained seven southern citations (7 species) and 37 northern citations (24 species) (Table 4). Britton's northern species include the following (those found typically in northern bogs are indicated with an asterisk):

Anemone canadensis
Carex lacustris
**C. trisperma*
Coptis groenlandica
Cornus canadensis
**Cypripedium reginae*
**Gaultheria hispidula*
Hierochloë odorata
**Larix laricina*
Lathyrus palustris
**Linnaea borealis*
**Menyanthes trifoliata*
Nemopanthus mucronata
**Parnassia glauca*
**Picea mariana*
Potentilla fruticosa
**Rhamnus alnifolia*
**Rubus pubescens*
**Salix candida*
S. gracilis
Sambucus pubens
Smilacina stellata
Trillium undulatum
Trollius laxus
**Vaccinium oxycoccos*

Rhododendron maximum was reported, but this species has also been reported from coastal plain and piedmont areas. Those species listed by Britton that are typically considered southern plants include:

Ascyrum hypericoides
Habenaria cristata
Magnolia virginiana
Polygala brevifolia
Scirpus rubricosus
Tipularia discolor
Xyris flexuosa

Tipularia discolor and *Scirpus rubricosus* were collected at Bergen Point (which is out of the Meadows) at the junction of Newark Bay and Kill Van Kull. Three of these species (*Habenaria cristata, Polygala brevifolia,* and *Xyris flexuosa*) have their northern-most distribution in the New Jersey Pine Barrens (McCormick, 1967) and are typically found in southern bogs. Another species (*Hypericum denticulatum*) likewise having its northern-most distribution in the New Jersey Pine Barrens was collected at Weehawk in or prior to 1819 (Torrey, 1819). *Ascyrum hypericoides, Magnolia virginiana* and *Xyris flexuosa* were also reported by Britton from Staten Island in 1880. In 1910, Stone, in listing plants found in the New Jersey Pine Barrens, included *Xyris flexuosa* while Fernald (1950) considered it as being found in "sandy and peaty pine-barrens or bogs, Fl. to Ark. and e. Tex., n. on the Coastal plain to N.J." Other southern species listed (not necessarily restricted to the south) included:

Calopogon pulchellus
Chamaecyparis thyoides
Chamaedaphne calyculata
Clethra alnifolia
Habenaria blephariglottis
Ilex glabra
I. laevigata
Leucothoë racemosa
Orontium aquaticum
Osmunda regalis var. *spectabilis*
Pogonia ophioglossoides
Vaccinium atrococcum
V. corymbosum
V. macrocarpon
Woodwardia areolata
W. virginica
Rhododendron viscosum

Some species listed are typically plants with northern distribution, but have also been reported as far south as New Jersey, Delaware or Maryland. *Arethusa bulbosa, Aster nemoralis, Cyperus dentatus,* and *Utricularia intermedia* represent this group. These four species, as well as those that occur in but are not necessarily restricted to the south and those listed as occurring only in the south today (28 in total), are found in the New Jersey Pine Barrens. This is a satisfactory reason for listing them as southern species, since the New Jersey Pine Barrens is considered mostly southern in floristic nature. Other species found in the Pine Barrens listed by Britton included:

Aletris farinosa
Asclepias amplexicaulis
Aster patens var. *phlogifolius*
Bidens coronata
Calamagrostis cinnoides
Chamaedaphne calyculata
Clitoria mariana
Cuscuta compacta
Eleocharis olivacea
Eragrostis spectabilis
Eupatorium pilosum
Gentiana saponaria
Gerardia purpurea
Iris prismatica
Lilium superbum
Ophioglossum vulgatum
Polygala cruciata
Quercus stellata
Scleria triglomerata
Viburnum nudum

However, some of them do occur elsewhere in South Jersey and are not restricted to the Pine Barrens. Britton reported 34 characteristic Pine Barren plants from Staten Island, and *Chamaecyparis thyoides* was reported from the northern tip of Staten Island by Taylor in 1915. Except for possible rare occurrences, such species do not occur in the Meadows or Staten Island area today.

Apparently, during this period (1889) much freshwater marsh existed because Britton, in making reference to *Zizania aquatica*, stated that it was "very abundant on Newark and Hackensack Marshes." *Lophotocarpus spongiosus* was reported for the Meadows region in general as well as *Sagittaria subulata,* while at New Durham *Lemna minor* was collected. *Lysimachia thyrsiflora* was reported from Little Ferry. Two species (*Bidens cernua* and *Equisetum fluviatile* forma *linnaeanum*) were reported from Rutherford and three species (*Carex versicaria* var. *monile, Fraxinus nigra* and *Glyceria acutiflora*) were reported from Lyndhurst.

Only seven citations were recorded at this time (1889) which included salt or brackish marsh species. Those recorded included *Kosteletzkya virginica, Sabatia dodecandra, Scirpus olneyi,* and *Typha angustifolia.* The first one and the latter two were stated to have occurred in general in the area while the latter was also found in the Newark Marshes. *Sabatia* was found at both Carlstadt and Bergen. No species restricted to salt marshes was reported, so it is assumed that this type of marsh was little or non-existent in the Hackensack Meadows, except perhaps in the southern part.

Hackensack Meadows — 1919

By 1919, when Harshberger and Burns published on the Hackensack Meadows, it had apparently changed considerably. Burns suggested that typical salt marsh flora existed at the mouth of the river near Newark Bay and gradually changed upstream into brackish flora in the center of the valley with freshwater marsh occurring in the northern area. It was further suggested that acid swamps still existed in the northern areas, but were absent from the southern. Harshberger stated that "a bog formation (not studied) probably exists in the northern part of the region." He also presented a photograph of a location where cedar stumps had been extracted in 1916. Burns, who collected and identified the species, reported *Calopogon pulchellus, Habenaria ciliaris, Pogonia ophioglossoides*, and *Lycopodium alopecuroides* near Moonachie, which gives an indication that this northern area still had extant cedar. He reported acidophiles such as *Osmunda regalis* var. *spectabilis* and *Utricularia intermedia* along the Belleview Turnpike and *Clethra alnifolia, Rhododendron viscosum* and *Vaccinium corymbosum* at Secaucus. Other species for which specific localities were not given included *Bidens coronata, Lilium superbum, Solidago uliginosa,* and *Vaccinium corymbosum.*
These species, typical of acid lowlands, can also be found in such areas in the New Jersey Pine Barrens as can the following species reported from Snake Hill:

Lespedeza hirta
L. intermedia
Solidago bicolor
Solidago nemoralis
Vaccinium vacillans

From Little Snake Hill, *Andropogon scoparius, Solidago bicolor* and *Solidago nemoralis* were reported. *Spiraea tomentosa* was found along the Belleview Turnpike.

The salt marsh extent in 1919 was described as ". . . fairly uniform in character. It is found at the mouths of the creeks and rivers which intersect the region, and around the margins of the lagoons and estuaries, forming extensions landward of Newark Bay. The influence of salt water is felt some distance above Newark Bay, and the tidal channels permit the entrance of sea water, so that daily the surface of the salt marsh is partly or wholly flooded with salt or brackish water." *Spartina alterniflora* var. *pilosa*, characteristic of salt marshes, was reported only from Sawmill Creek southward. Thus it is assumed that the salt marsh did not extend farther upstream from the junction of Sawmill Creek and the Hackensack River. Harshberger (1919) in writing of the Meadows also stated that "The outer margin of the salt marsh, where it touches the open lagoon, or the tidal thoroughfare, is fringed with a broader, or a narrower, strip of the tall salt grass, *Spartina glabra* var. *pilosa* [*S. alterniflora* var. *pilosa*]. Back of this strip, whose width depends on the slope and the height to which the tide rises, we find the rush salt grass, *Spartina patens,* which grows at a slightly higher tidal level. Then came the extensive areas of the black grass, *Juncus gerardi,* upon which, in part, the economic value of the marsh depends. Sometimes there are extensive areas covered with the lesser salt grass, *Distichlis spicata.* The sea lavender, *Limonium carolinianum,* is also found with the samphires [*Salicornia* sp.], as also *Suaeda maritima* and *Atriplex patula.*" Burns additionally listed *Iva frutescens* var. *oraria* as occurring in the Meadows as well as *Echinochloa walteri, Cyperus filicinus, Sabatia stellaris* and *Spartina cynosuroides.* All of these can be found in salt or brackish marshes, but some species that he listed occur in either salt, brackish, or fresh water marshes such as *Amaranthus cannabinus, Scirpus americanus* and *Solidago sempervirens.* Others, usually considered as brackish marsh species (*Chenopodium ambrosioides, Rumex orbiculatus,* and *Spartina patens* var. *monogyna*), were also included. Some species typically found in either fresh or brackish marshes near the coast were listed such as:

Bidens laevis
Dryopteris thelypteris
Hibiscus moscheutos
Juncus canadensis
Onoclea sensibilis
Pluchea camphorata
Polygonum hydropiperoides
Ptilimnium capillaceum
Typha angustifolia

Hibiscus moscheutos apparently was quite abundant since Burns stated that "in August the marsh looks like a vast flower garden, for many areas are colored white and pink by the profusion of the large flowers." In 1909 the area was described as being "gay in the fall with acres of mallow" (Anonymous, 1910). Most of the plants in Burns' list were considered quite common with *Typha angustifolia* being especially so!

By 1919 *Phragmites australis* was probably very abundant since it was reported to cover extensive areas and to be impressive at all seasons (this is how it would be described today). Harshberger stated that *Phragmites australis* competed with such species as *Typha angustifolia* and *Typha latifolia* for occupation of the marshland.

Even though many salt and brackish marsh species were reported, it is thought by this author that much freshwater marsh existed also in 1919 because plants typical of such a marsh were reported by Harshberger and Burns. Several species of *Potamogeton* were reported as well as drainage ditches covered with *Lemna minor. Sagittaria latifolia* was reported to be found in standing water everywhere while *Bidens laevis* in early September brightened the area with patches of gold. Other species listed as occurring commonly at Moonachie were:

Alisma subcordatum
Cicuta maculata
Menyanthes trifoliata
Peltandra virginica
Sium suave
Samolus parviflorus

Zizania aquatica was reported from usually deeper water in certain areas where it formed associations of considerable size.

Many lowland plants, not necessarily hydrophytes, were reported (Table 5). Many of the following species probably occurred on the marsh periphery or in the fresh water marsh itself:

Asclepias incarnata var. *pulchra*
Bidens frondosa
Eupatorium perfoliatum
E. purpureum
Helianthus giganteus
Polygonum sagittatum
Quercus bicolor
Rudbeckia laciniata
Sambucus canadensis
Scirpus cyperinus
Verbena hastata

Other species of an upland character were listed as well as the flora of Snake and Little Snake Hills (Table 5). Furthermore, this was the first report on large numbers of ruderal plant species for the area with 63 being mentioned. Most of these are from dry habitats and probably were found on the periphery of the Meadows or along access routes across it. However, it is not doubted by this author that such plants did occur there at earlier dates. As far back as 1881 Addison Brown (in Britton, 1881) collected 99 ballast plants, mostly of European origin, at Communipaw. Even Torrey (1819) listed some from the Hoboken and Greenwich areas (Table 3).

Hackensack Meadows — 1949

After Harshberger and Burns, the next person who published on the Hackensack Meadows was Heusser (1949). His study was restricted to the Secaucus area.

Although most traces of a northern element in the Meadows had disappeared by 1919, some cedar swamp did exist. However, in Heusser's study, no northern element was found, only a few species typical of southern areas were encountered, and even those species occur elsewhere. Heusser reported on six cedar trees at Moonachie in April of 1949 but stated that the last of the cedar at Secaucus died in 1935. In Heusser's list (Table 6) the following acidophiles (not necessarily southern or northern species) were reported:

Hypericum virginicum
Leucothoë racemosa
Osmunda regalis var. *spectabilis*
O. cinnamomea
Rhododendron viscosum
Vaccinium corymbosum var. *albiflorum*
V. corymbosum var. *corymbosum*
Viburnum nudum

All of these occur in cedar swamps in South Jersey. Other species also found in the Pine Barrens, but from upland sites include:

Gaylussacia frondosa
Gnaphalium obtusifolium var. *praecox*
Parthenocissus quinquefolia
Solidago rugosa

The area Heusser studied was actually a dying cedar swamp between the Cromakill and Mill Creeks. He also examined the surrounding marshland where he described four zones — *Spartina, Typha angustifolia-Scirpus olneyi, Scirpus olneyi,* and *Phragmites australis.* The bog itself was composed mostly of shrubs, scattered trees, and invading herbaceous plants. His data suggest that mostly brackish conditions prevailed. The following salt marsh species were reported:

Aster subulatus
Baccharis halimifolia
Juncus gerardi
Distichlis spicata
Spartina alterniflora var. *pilosa*
S. patens

Others typical of salt or brackish conditions included:

Cyperus filicinus
Echinochloa walteri
Scirpus olneyi
S. robustus

Some of those listed have broad tolerances of salinity and can be found in either fresh, brackish, or salt marsh environments such as:

Amaranthus cannabinus
Atriplex patula
Aster novi-belgii
Scirpus americanus
Solidago sempervirens

Others listed by Heusser typically occur in either fresh or brackish waters:

Bidens laevis
Hibiscus moscheutos
Polygonum hydropiperoides
Ptilimnium capillaceum
Ranunculus sceleratus
Scirpus validus var. *creber*
Spartina cynosuroides

Species collected that are usually restricted to fresh to slightly brackish environments included:

Alisma subcordatum
Caltha palustris
Cicuta maculata
Eleocharis palustris
Lemna minor
Rorippa islandica var. *hispida*
Peltandra virginica
Sagittaria latifolia
Sium suave
Typha latifolia

Many other species were listed by Heusser, most of which grow typically in moist habitats (Table 6). Some of those found were:

Asclepias incarnata var. *pulchra*
Bidens connata
B. coronata
Cyperus strigosus
Eupatorium perfoliatum
E. purpureum
Iris versicolor
Lysimachia thyrsiflora
Quercus bicolor
Q. palustris

Because the area is wet, few ruderal species were found. Only six were listed.

Subsequent to Heusser's study, it is assumed that *Phragmites australis* became more prevalent at the expense of the freshwater marsh vegetation, although some fresh water species listed by Heusser probably still exist there today. However, it is suggested (based upon reported salinities by Heusser, 1949; Potera, 1970; and personal examination) that presently the area is composed mostly of brackish marsh. The present rarity of freshwater marsh species also suggests, at least floristically, the absence of freshwater environments (except for possible localized occurrences and wetlands impounded by dikes).

Factors Causing Vegetation Change

After 1896 the cedar swamps in the Hackensack Meadows must have declined sharply, because Harshberger suggests that in 1919 they only occurred in the northern part of the Meadows, while at Newark only a few plants were reported. Diking and ditching probably aided the decline of many cedar areas. For example, in 1867 the Iron Dike Land Reconstruction Company constructed a dike following the lower part of the Passaic River south and then up the Hackensack River to Sawmill Creek and finally up Sawmill Creek itself. This completely isolated a section that was shown by Vermeule (1896) to be a large area where cedar trees once existed. Because diking prevents the influx of tidal water and at the same time tends to drain the diked area, this factor probably was effective in destroying the cedar marsh in the Sawmill Creek area. Between 1869 and 1887 a subsidence of three to three and a half feet was reported from peat areas in the Hackensack Meadows due to the lowering of the water table (Waksman, 1942). This drainage also subjected the cedar to fire hazard as suggested by Heusser (1949). Both ditching and diking undoubtedly were conducive to the spread of *Phragmites australis*. A further decline of the cedar may have resulted from the cutting of cedars for planking in road use (Heusser, 1949).

A rising sea level also played an important role in the vegetation changes in the Meadows. This sea level change, which was substantiated by Heusser's finding of marsh peat on top of cedar bog peat, was also accompanied by an influx of salt water, attested to by the fact that most species reported from the marsh peat were brackish marsh plants. Thus, the salt encroachment could definitely have helped implement the cedar's decline. The highest salinities reported by Heusser for the Secaucus cedar bog (the trees were dead) for spring, summer, and fall, respectively, were 5.10, 6.95, and 20.75 percent sea water and Potera (1970) reported extremes of salinity of from 6.0 0/00 to 15.7 0/00 (parts per thousand) from the Sawmill Creek area. Furthermore, Harshberger, in 1919, reported that the salt marsh species *Spartina alterniflora* occurred no farther than Sawmill Creek on the Hackensack River; however brackish marsh species could have extended upstream much farther. Heusser (1949), on the other hand, reported extant salt marsh plants about a mile north at Secaucus, and the present study showed their existence upstream from Little Ferry. Hence, there was a great change in salt water encroachment subsequent to Harshberger's study which would have further affected the cedar adversely. Probably this salt water penetration has been in effect at least since the construction of the Ordell Reservoir (completed in 1922) which cuts off almost all of the river-flow. Below the Reservoir at New Milford, for instance, a discharge as low as 8 cfs (cubic feet per second) has been reported with 180 cfs being discharged 90 percent of the time (Hackensack Water Company, 1970). As a consequence, almost all the water-flow downstream comes from base flow below the reservoir or from runoff.

Diking could prevent salt water encroachment and has in the past (Vermeule, 1897). The current efficiency of the dikes is in doubt, however, because they are not maintained. In addition, the Meadows have long been under tidal influence except for an area that is presently the site of the Teterboro Airport. Many areas behind the dikes, such as areas "A", "B" and "C" have salt and brackish marsh species. These, along with the freshwater marsh species, were also reported by Heusser in 1949 for the Secaucus region which is area "B". In the present survey no strictly freshwater marsh plants could be found within the area of tidal influence with the exception of the local occurrence of duckweed (*Lemna minor*), the water-plantain (*Alisma subcordatum*) and the common cat-tail (*Typha latifolia*). The duckweed was seen in a small pond at Rutherford, in a drainage ditch near Little Snake Hill, and in other small drainage areas in the Meadows. However, the water-plantain was seen in only one locality (one specimen) along Plank Road in Carlstadt. The common cat-tail was seen only in a few areas such as along Plank Road at Carlstadt. Not a single specimen of *Zizania aquatica* was observed, whereas in 1919 *Zizania* was reported in great abundance (Harshberger, 1919). No representatives of the genus *Bidens* were found. These too were abundant in 1919.

LITERATURE CITED

ANONYMOUS. 1910. New Jersey State Museum Ann. Rept. for 1909 including the insects of N. J. 888 p.

ANTEVS, E. 1928. The last glaciation, with special reference to the ice retreat in northeastern North America. Am. Geog. Soc. Res. Ser. No. 17:1-292.

BRITTON, N. L. 1880. On the northward extension of the N. J. Pine Barren flora on Long and Staten Islands. Bull. Torrey Botan. Club 6:81-83.

————. 1881. A preliminary catalogue of the flora of New Jersey. New Brunswick, N. J. 233 p.

————. 1889. Catalogue of plants found in New Jersey. N. J. Geol. Survey, Final Rept. State Geologist. 642 p.

CLAYTON, W. D. 1968. The correct name for the common reed. Taxon 17:168-169.

FERNALD, M. L. 1950. Gray's manual of botany. 8th ed. American Book Co., N. Y. 1,632 p.

GIFFORD, J. 1895. A preliminary report on the forest conditions of South Jersey. N. J. Geol. Survey, Ann. Rept. State Geologist. 41 p.

GRAY, A. 1856. Manual of botany of the northern United States. George P. Putnam & Co., N. Y. 739 p.

HARSHBERGER, J. W. and V. G. BURNS. 1919. The vegetation of the Hackensack Marsh: a typical American fen. Wagner Ins. Sci. 9:1-35.

HEUSSER, C. J. 1949. History of an estuarine bog at Secaucus, New Jersey. Bull. Torrey Botan. Club 76:385-406.

————. 1963. Pollen diagrams from three former cedar bogs in the Hackensack tidal marsh, northeastern New Jersey. Bull. Torrey Botan. Club 90:16-28.

MCCORMICK, J. 1967. Pine Barrens of New Jersey: a study of significance. Prepared by the Acad. Nat. Sci. Phila. for the Nat. Park Serv., U. S. Dept. Interior. 28 p.

POTERA, G. T. 1970. A preliminary ecologic study and evaluation of a section of the Hackensack Meadowlands. Unpublished report.

REEDS, C. A. 1927. Glacial lakes and clays near New York City. Nat. Hist. 27:54-64.

ROBINSON, B. J. and M. L. FERNALD. 1908. Gray's manual of botany. 7th ed. American Book Co., N. Y. 926 p.

ROSENWINKEL, E. R. 1964. Vegetational history of a New Jersey tidal marsh, bog, and vicinity. Bull. N. J. Acad. Sci. 9:1-20.

SCHUBERTH, C. J. 1968. The geology of New York City and environs. The Natural History Press, Garden City, N. Y. 304 p.

SIPPLE, W. S. 1971. The Past and Present Flora and Vegetation of the Hackensack Meadows, New Jersey, and Suggestions for Management. Master of Regional Planning Thesis, Department of Landscape Architecture and Regional Planning, University of Pennsylvania, Philadelphia. vi + 165 p. and 1:24,000 Vegetation Map.

STONE, W. 1911. The plants of southern New Jersey with special reference to the flora of the Pine Barrens. New Jersey State Museum Ann. Rept. 1910. p. 21-828.

TAYLOR, N. 1915. Flora of the vicinity of New York. New Era Printing Co., Lancaster, Pa. 683 p.

TORREY, J. C., et al. 1819. A catalogue of plants growing spontaneously within thirty miles of the City of New-York. Websters & Skinners, N. Y. 100 p.

TRANSEAU, E. N. 1903. On the geographical distribution and ecological relations of the bog plant societies of northern North America. Botan. Gaz. 36:401-420.

U. S. Geological Survey Map Series. Jersey City, N. J. — N. Y. 1967.

U. S. Geological Survey Map Series. Weehawken, N. J. — N. Y. 1967.

VERMEULE, C. C. 1897. Drainage of the Hackensack and Newark tidemarshes. N. J. Geol. Surv. Ann. Rept. State Geologist 1896:287-317.

WAKSMAN, S. A. 1942. The peats of New Jersey and their utilization. Part I. Bull. 55A Geol. Ser. N. J. Dept. Conserv. & Dev.

ACKNOWLEDGMENTS

I am grateful for the guidance and support of Dr. M. H. Levin who patiently worked with me during the entire study. Drs. D. E. Fairbrothers, E. T. Wherry, R. B. Hanawalt and A. E. Schuyler reviewed the manuscript. Dr. Wherry was particularly helpful in nomenclatural interpretation, Dr. A. Cronquist was helpful during my visit to the New York Botanical Garden, and Patricia Cress assisted by typing the manuscript. Geraldine Sipple is thanked for her patience and aid for the duration of this project. Bayard Long Funds from the Academy of Natural Sciences of Philadelphia provided support for the collection and identification of plant species.

TABLE 1. — List of Species Encountered and/or Collected in the Present Study.

- Osmundaceae
  - *Osmunda cinnamomea*
  - *O. regalis* var. *spectabilis*
- Polypodiaceae
  - *Dennstaedtia punctilobula*
  - *Dryopteris noveboracensis*
  - *Onoclea sensibilis*
  - *Pteridium aquilinum*
  - *Woodwardia virginica*
- Typhaceae
  - *Typha angustifolia*
  - *T. latifolia*
- Alismataceae
  - *Alisma subcordatum*
- Gramineae
  - *Agropyron repens*
  - *Andropogon scoparius*
  - *A. virginicus*
  - *A. virginicus abbreviatus*
  - *Bromus japonicus*
  - *Calamagrostis canadensis*
  - *Deschampsia caespitosa*
  - *Digitaria sanguinalis*
  - *Distichlis spicata*
  - *Echinochloa walteri*
  - *Eleusine indica*
  - *Holcus lanatus*
  - *Panicum clandestinum*
  - *P. dichotomiflorum*
  - *P. virgatum*
  - *Phragmites australis*
  - *Setaria faberi*
  - *Sorghastrum nutans*
  - *Spartina alterniflora*
  - *S. cynosuroides*
  - *S. patens*
  - *Triodia flava*
- Cyperaceae
  - *Cyperus strigosus*
  - *Eleocharis parvula*
  - *Rhynchospora chalarocephala*
  - *Scirpus americanus*
  - *S. cyperinus*
  - *S. olneyi*
- Lemnaceae
  - *Lemna minor*
- Juncaceae
  - *Juncus marginatus*
  - *Juncus tenuis*
- Liliaceae
  - *Lilium superbum*
  - *Maianthemum canadense*
  - *Smilax glauca*
  - *S. rotundifolia*
  - *Uvularia sessilifolia*
- Iridaceae
  - *Iris prismatica*
- Salicaceae
  - *Populus grandidentata*
  - *P. tremuloides*
  - *Salix nigra*
- Corylaceae
  - *Betula lenta*
  - *B. populifolia*
  - *Carpinus caroliniana*
- Fagaceae
  - *Quercus alba*
  - *Q. bicolor*
  - *Q. palustris*
  - *Q. prinus*
  - *Q. rubra*
  - *Q. stellata*
- Ulmaceae
  - *Celtis occidentalis*
  - *Ulmus americana*
- Urticaceae
  - *Humulus japonicus*
- Polygonaceae
  - *Polygonum cuspidatum*
  - *P. cespitosum*
  - *P. punctatum*
  - *Rumex acetosella*
  - *R. crispus*
- Amaranthaceae
  - *Amaranthus cannabinus*
- Phytolaccaceae
  - *Phytolacca americana*
- Caryophyllaceae
  - *Lychnis alba*
  - *Saponaria officinalis*
- Ranunculaceae
  - *Thalictrum polygamum*
- Lauraceae
  - *Lindera benzoin*
  - *Sassafras albidum*
- Cruciferae
  - *Lepidium virginicum*
- Hamamelidaceae
  - *Hamamelis virginiana*
  - *Liquidambar styraciflua*
- Rosaceae
  - *Potentilla canadensis*
  - *P. recta*
  - *Prunus serotina*
  - *Pyrus melanocarpus*
  - *Rubus* sp.
  - *Spiraea latifolia*
  - *S. tomentosa*
- Leguminosae
  - *Melilotus alba*
  - *M. officinalis*
  - *Robinia pseudo-acacia*

TABLE 1. (*Continued*) — List of Species Encountered and/or Collected in the Present Study.

- *Trifolium pratense*
- *Vicia cracca*

- Simaroubaceae
  - *Ailanthus altissima*
- Polygalaceae
  - *Polygala sanguinea*
- Euphorbiaceae
  - *Euphorbia supina*
- Anacardiaceae
  - *Rhus copallina*
  - *R. glabra*
  - *R. typhina*
- Aquifoliaceae
  - *Ilex verticillata*
- Aceraceae
  - *Acer rubrum*
- Balsaminaceae
  - *Impatiens capensis*
- Malvaceae
  - *Hibiscus* sp.
- Guttiferae
  - *Hypericum canadense*
  - *H. mutilum*
  - *H. perforatum*
- Lythraceae
  - *Lythrum salicaria*
- Nyssaceae
  - *Nyssa sylvatica*
- Melastomataceae
  - *Rhexia virginica*
- Onagraceae
  - *Epilobium hirsutum*
  - *Ludwigia alternifolia*
  - *Oenothera biennis*
- Umbelliferae
  - *Daucus carota*
  - *Pastinaca sativa*
- Clethraceae
  - *Clethra alnifolia*
- Ericaceae
  - *Rhododendron viscosum*
  - *Vaccinium corymbosum*
- Primulaceae
  - *Lysimachia* × *producta*
  - *L. quadrifolia*
  - *L. terrestris*
- Gentianaceae
  - *Bartonia virginica*
- Apocynaceae
  - *Apocynum cannabinum*
- Asclepiadaceae
  - *Asclepias tuberosa*
- Convolvulaceae
  - *Convolvulus sepium*
- Verbenaceae
  - *Verbena hastata*
  - *V. urticifolia*
- Solanaceae
  - *Petunia violacea*
  - *Solanum dulcamara*
  - *Solanum* sp.
- Scrophulariaceae
  - *Scrophularia lanceolata*
  - *Verbascum blattaria*
  - *V. thapsus*
- Plantaginaceae
  - *Plantago lanceolata*
- Rubiaceae
  - *Cephalanthus occidentalis*
- Caprifoliaceae
  - *Sambucus canadensis*
  - *Viburnum dentatum*
- Compositae
  - *Achillea millefolium*
  - *Ambrosia artemisiifolia*
  - *Arctium minus*
  - *Artemisia vulgaris*
  - *Aster pilosus*
  - *Aster subulatus*
  - *Baccharis halimifolia*
  - *Centaurea scabiosa*
  - *Chrysanthemum leucanthemum*
  - *Cirsium arvense*
  - *Erechtites hieracifolia*
  - *Erigeron annuus*
  - *Eupatorium dubium*
  - *Helianthus annuus*
  - *Pluchea purpurascens*
  - *Solidago altissima*
  - *S. graminifolia*
  - *S. sempervirens*
  - *Tragopogon porrifolius*

Table 2. — List of species examined in the New York Botanical Garden herbarium to ascertain the validity of identifications and citations from the Hackensack Meadows.

SPECIES EXAMINED	COLLECTION LOCALITY	DATE(S) OF COLLECTION
Arethusa bulbosa	New Durham	1819
Calla palustris	Woodridge	1874
Calopogon pulchellus	Carlstadt	1883
Carex lacustris	Bergen	None
Chamaecyparis thyoides	Secaucus	1862
Coptis groenlandica	New Durham	None
Distichlis spicata	Bergen Point	1868
Drosera rotundifolia	New Durham, Staten Island	1890, 1878
Habenaria blephariglottis	Arlington, Staten Island, Secaucus, Hackensack Swamp	1896, 1896, 1865, 1865
Ilex glabra	New Durham	1853
Linnaea borealis	New Durham	1865
Lophotocarpus spongiosus	Lyndhurst	1915
Menyanthes trifoliata	New Durham	1865
Nemopanthus mucronata	Secaucus	1865
Orontium aquaticum	Little Ferry	1887
Parnassia glauca	Moonachie	1901
Phragmites australis	Hackensack Meadows, near Rutherford	1868 & 1903, 1889
Pogonia ophioglossoides	Carlstadt	1885
Polygala cruciata	Moonachie	1915
Rubus pubescens	Weehawken, New Durham, Bergen	1871, 1871, 1870
Sarracenia purpurea	New Durham	1827
Spartina alterniflora	Rutherford, Weehawken	1889 & 1892, 1895
S. cynosuroides	Hackensack Meadows, Hackensack Swamp, Rutherford, Moonachie	1903 & 1876, 1865, 1889, 1901
Tipularia discolor	Bergen Point	1867
Tientalis borealis	Secaucus	1864
Trollius laxus	Rutherford	1887
Typha angustifolia	New Durham	1868 & 1875
Utricularia intermedia	Hackensack Swamp	1868
Xyris flexuosa	Staten Island	None
Zizania aquatica	Moonachie, Bergen, Woodridge	1901, 1895, 1889

TABLE 3. — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Torrey, et al, 1819) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (TORREY, 1819)	LOCALITY [2]										
		1	2	3	4	5	6	7	8	9	10	11
Andropogon virginicus L. var. *abbreviatus* (Hack.) Fern. & Grisc.	*A. macrouros* Mx.											×
Angelica atropurpurea L.											×	
Apocynum androsaemifolium L.	*Apocynum androsaemifolium* (L.) Br.										×	
Arabidopsis thaliana (L.) Heynh.	*Arabis Thaliana* Willd.										×	
Arabis canadensis L.	*A. falcata* Mx.							×			×	
Arenaria lateriflora L.										×		
Arethusa bulbosa L.	*Arethusa bulbosa* Sw.				×							
Aristolochia serpentaria L.							×					
Asarum canadense L.											×	
Asclepias exaltata L.	*Asclepias phytolaccoides* (Lyon) Ph.											×
Aster nemoralis Ait.	*Aster ledifolius* Ph.	×										
A. puniceus L.												×
A. undulatus L. var. *diversifolius* (Michx.) Gray	*A. diversifolius* Mx.										×	
Bartonia paniculata (Michx.) Muhl.	*B. paniculata* Mx.											×
Bidens coronata (L.) Britt.	*Coreopsis trichosperma* Mx.	×										
Boehmeria cylindrica (L.) Sw.	*B. cylindrica* Willd.					×						
Botrychium dissectum Spreng.	*Botrychium fumaroides* Willd.							×				
B. virginianum (L.) Sw.	*B. gracile* Ph.										×	
Bulbostylis capillaris (L.) C. B. Clarke	*Scirpus capillaris* Muhl.										×	
Cakile edentula (Bigel.) Hook.	*Cakile edentula* L.										×	
Calla palustris L.		×									×	
Caltha palustris L.		×										
Campanula aparinoides Pursh									×			
Carex collinsii Nutt.	*C. subulata* Mx.				×							
C. comosa Boott	*C. pseudo-cyperus* Willd.	×										
C. lupulina Muhl.	*C. lupulina* Willd.										×	
C. squarrosa L.											×	
Cassia fasciculata Michx.	*Cassia chamaecrista* L.										×	

TABLE 3. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Torrey, et al, 1819) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (TORREY, 1819)	LOCALITY [2]										
		1	2	3	4	5	6	7	8	9	10	11
Chaerophyllum procumbens (L.) Crantz	*Chaerophyllum procumbens* L.										×	
Chamaecyparis thyoides (L.) BSP.	*Cupressus thuyoides* L.	×										
Chamaedaphne calyculata (L.) Moench	*Andromeda calyculata* L.											×
Chenopodium rubrum L.	*Blitum maritimum* Nutt.										×	
Cicuta bulbifera L.											×	
Cinna arundinacea L.						×						
Cirsium discolor (Muhl.) Spreng.	*Cnicus discolor* Muhl.										×	
C. muticum Michx.	*Cnicus muticus* (Muhl.) Ph.										×	
Clematis virginiana L.											×	
Coptis groenlandica (Oeder) Fern.	*Coptis trifolia* Salisb.				×							
Cornus canadensis L.		×										
C. stolonifera Michx.	*Cornus alba* Willd.										×	
Cunila origanoides (L.) Britt.	*Cunila mariana* L.						×					
Cyperus diandrus Torr.	*Cyperus diandrus* (sp. nov.)										×	
C. filicinus Vahl	*C. caespitosus* (sp. nov.)										×	
Cypripedium reginae Walt.	*Cypripedium spectabile* Willd.				×							
Decodon verticillatus (L.) Ell.	*Lythrum verticillatum* L.				×							
Dentaria laciniata Muhl.	*D. laciniata* Willd.										×	
Diospyros virginiana L.							×	×				
Draba verna L.											×	
Drosera intermedia Hayne	*Drosera longifolia* L.	×										
D. rotundifolia L.		×										
Dulichium arundinaceum (L.) Britt.	*Dulichium spathaceum* Rich										×	
Echinochloa walteri (Pursh) Nash	*Panicum hispidum* Muhl.										×	
Eleocharis intermedia (Muhl.) Schultes	*Scirpus intermedia* Muhl.											×
Elymus canadensis L.	*E. glaucifolius* Willd.										×	
E. villosus Muhl.?	*E. striatus* L.										×	
E. virginicus L.											×	

Table 3. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Torrey, et al, 1819) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (TORREY, 1819)	LOCALITY [2]										
		1	2	3	4	5	6	7	8	9	10	11
Epifagus virginiana (L.) Bart.	*Epifagus americanus* Nutt.										×	
Equisetum hyemale L.											×	
Equisetum palustre L.												×
Epilobium coloratum Biehler	*Epilobium coloratum* Muhl.										×	
Eriophorum tenellum Nutt.	*Eriophorum angustifolium* L.	×										
Eryngium aquaticum L.	*Eryngium virginianum* Lmk.										×	
Eupatorium pilosum Walt.	*Eupatorium teucrifolium* Willd.										×	
E. purpureum L.	*E. laevigatum* (sp. nov.)	×										
E. rugosum Houtt.	*E. ageratoides* Willd.										×	
E. sessilifolium L.							×					
Fimbristylis castanea (Michx.) Vahl	*Scirpus spadicus* (L.) Muhl.										×	
Galium asprellum Michx.											×	
G. triflorum Michx.											×	
Gaultheria procumbens L.		×			×							
Gentiana saponaria L.	*Gentiana Saponaria* L.-Ph.							×				
Geum rivale L.												×
Glyceria fluitans (L.) R. Br.	*Poa fluitans* Sm.										×	
Glyceria obtusa (Muhl.) Trin.	*Glyceria obtusa* Muhl.											×
Habenaria ciliaris (L.) R.Br.	*Orchis ciliaris* L.										×	
H. clavellata (Michx.) Spreng.	*Orchis tridentata* Willd.	×										
H. cristata (Michx.) R.Br.	*Orchis cristata* Mx.	×										
H. fimbriata (Ait.) R.Br.	*Orchis fimbriata* Willd.								×			
Helenium autumnale L.												×
Heracleum maximum Bartr.	*H. lanatum* Mx.										×	
Hibiscus moscheutos L.	*Hibiscus moscheutos* Willd.										×	
Holcus lanatus L.											×	
Hypericum canadense L.											×	
H. denticulatum Walt.	*Hypericum angulosum* Mx.				×							

Table 3. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Torrey, et al, 1819)[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (TORREY, 1819)	LOCALITY[2]										
		1	2	3	4	5	6	7	8	9	10	11
H. virginicum L.	*H. virginianum* L.										×	
Ilex ambigua Michx. (Small, 1933)		×										
I. glabra (L.) Gray	*I. glaber* L.	×										
Iris versicolor L.				×								
Juncus biflorus Ell.	*Juncus aristatus* Mx.										×	
Juncus dichotomus Ell.	*J. bulbosus* Muhl.										×	
Kalmia latifolia L.								×				
Lactuca canadensis L.	*Sonchus pallidus* Willd.						×					
Laportea canadensis (L.) Wedd.	*Urtica canadensis* L.									×		
Larix laricina (DuRoi) K. Koch	*Pinus pendula* Ait.	×										
Lathyrus palustris L. var. *myrtifolius* (Muhl.) Gray	*Lathyrus myrtifolius* Willd.									×		
Leucothoë racemosa (L.) Gray	*Andromeda racemosa* (no author given)										×	
Liatris scariosa (L.) Willd.	*Liatris scariosa* L.											×
Lilium canadense L.											×	
Liparis lilifolia (L.) Richard	*L. liliifolia* Sw.				×							
Listera convallarioides (Sw.) Nutt.	*Epipactis convallarioides* Sw.	×										
Lobelia spicata Lam.	*L. claytoniana* Mx.					×						
Lonicera americana K. Koch	*Lonicera grata* Ait.	×										
Lysimachia hybrida Michx.											×	
L. thyrsiflora L.	*Lysimachia capitata* Ph.	×										
Malaxis unifolia Michx.		×										
Melanthium virginicum L.	*M. virginicum* Willd.								×			
Mimulus ringens L.											×	
Muhlenbergia frondosa (Poir.) Fern.	*Agrostis Mexicana* Muhl.											×
M. glomerata (Willd.) Trin.	*M. glomeratus* Willd. R & S.		×									
M. schreberi J. F. Gmel.	*M. diffusa* Schreb.						×					
M. sylvatica Torr.	*Agrostis truncata* Muhl.										×	

TABLE 3. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Torrey, et al, 1819)[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (TORREY, 1819)	LOCALITY[2]										
		1	2	3	4	5	6	7	8	9	10	11
Myosotis verna Nutt.	*M. virginiana* L.										×	
Nelumbo lutea (Willd.) Pers.?	*Nuphar lutea* Ait.											×
Orchis spectabilis L.											×	
Orontium aquaticum L.				×								
Osmunda regalis L. var. *spectabilis* (Willd.) Gray	*O. spectabilis* Willd.										×	
Panicum commutatum Schultes	*P. nervosum* Muhl.										×	
P. dichotomiflorum Michx.	*P. geniculatum* Muhl.										×	
Phragmites australis (Cav.) Trin. ex Steudel (Clayton, 1968)	*Arundo phragmites* L.								×			
Phryma leptostachya L.											×	
Physalis subglabrata Mackenz. & Bush	*Physalis pennsylvanica* L.										×	
Picea mariana (Mill.) BSP.	*Pinus nigra* Ait.	×										
Pogonia ophiogossoides (L.) Ker.	*Arethusa ophioglossoides* L.	×										
Polygala cruciata L.	*P. cruciata* Willd.										×	
P. paucifolia Willd.		×										
P. sanguinea L.											×	
Polygonum hydropiperoides Michx.					×							
Pontederia cordata L.												×
X*Populus gileadensis* Rouleau	*Populus candicans* Ait.										×	
Populus nigra L.	*P. betulifolia* Ph.										×	
Potamogeton natans L.												×
Potentilla fruticosa L.						×						
P. palustris (L.) Scop.	*Comarum palustre* L.											×
Pycnanthemum incanum (L.) Michx.	*P. incanum* Mx.							×				
P. muticum (Michx.) Pers.	*P. muticum* Pers.						×					
Ranunculus repens L.												×
Rhododendron maximum L.					×							

TABLE 3. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Torrey, et al, 1819)[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (TORREY, 1819)	LOCALITY[2]										
		1	2	3	4	5	6	7	8	9	10	11
Rotala ramosior (L.) Koehne	*Ammania ramosior* Mx.?		×									
Rubus hispidus L. var. *obovalis* (Michx.) Fern.	*Rubus obovalis* Mx.				×							
Rubus odoratus L.							×	×				
Rudbeckia laciniata L.	*R. laciniata* Willd.					×						
Sabatia dodecandra (L.) BSP.	*Sabbatia chlorides* Ph.		×									
Sagittaria latifolia Willd. or *S. engelmanniana* J. G. Smith	*Sagittaria sagittifolia* L.										×	
Sagittaria latifolia Willd. forma *hastata* (Pursh) Robins.	*Sagittaria hastata* Ph. (var. of *sagittifolia* L.?)				×							
Salix lucida Muhl.	*S. lucida* Willd.	×										
Sanguinaria canadensis L.				×								
Sanguisorba canadensis L.												×
Sarracenia purpurea L.					×							
Saururus cernuus L.		×										
Saxifraga pensylvanica L.	*Saxifraga pennsylvanica* L.				×							
Scleria triglomerata Michx.										×		
Scrophularia marilandica L.											×	
Senecio pauperculus Michx. var. *balsamitae* (Muhl.) Fern.	*Senecio Balsamitae* Willd.											×
Sium suave Walt.	*Sium lineare* L.	×										
Smilax herbacea L.											×	
Solidago graminifolia (L.) Salisb.	*Solidago graminifolia* Nutt.										×	
S. odora Ait.							×					
Sonchus arvensis L.											×	
Spartina cynosuroides (L.) Roth.	*Spartina polystachya* Muhl.									×		
Spergula arvensis L.											×	
Sphenopholis obtusata (Michx.) Scribn.	*Aira truncata* Muhl.										×	
Spiraea alba DuRoi	*S. salicifolia* Ait.					×						×

TABLE 3. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Torrey, et al, 1819)[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (TORREY, 1819)	LOCALITY[2]										
		1	2	3	4	5	6	7	8	9	10	11
S. tomentosa L.						×						
Spirodela polyrhiza (L.) Schleid.	*Lemna polyrhiza* L.										×	
Sporobolus vaginiflorus (Torr.) Wood	*Agrostis virginica* Muhl.										×	
Strophostyles helvola (L.) Ell.	*Phasaeolus trilobus* Mx.										×	
S. umbellata (Muhl.) Britt.	*Phasaeolus helvolus* L.										×	
Teucrium canadense L.											×	
Tilia americana L.	*T. glabra* Vent. et Ph.						×				×	
T. neglecta Spach	*T. pubescens* Vent.					×						
Trientalis borealis Raf.	*Trientalis Europaea* L.	×										
Triglochin maritima L.											×	
Trillium undulatum Willd.	*Trillium erythrocarpum* Mx.	×										
Triosteum perfoliatum L.											×	
Tripsacum dactyloides L.	*Tripsacum dactyloides* Willd.										×	
Tsuga canadensis (L.) Carr.	*Pinus canadensis* L.							×				
Ulmus rubra Muhl.	*U. fulva* Mx.										×	
Vaccinium oxycoccos L. var. *ovalifolium* Michx.	*Oxycoccus vulgaris* Ph.	×										
Verbena officinalis L.	*V. spuria* L.			×								
V. simplex Lehm.	*V. angustifolia* Mx.										×	
Viburnum alnifolium Marsh.	*Viburum lantanoides* Mx.							×				
Vicia sativa L.	*Vicia sativa* Walt. L.										×	
Viola rafinesguii Greene	*Viola concolor* Ph.			×								
Woodsia obtusa (Spreng.) Torr.?	*Aspidium obtusum* Willd.										×	
Woodwardia virginica (L.) Sm.	*W. virginica* Willd.											×
Xyris caroliniana Walt.			×									
X. caroliniana Walt.?	*X. Jupicai* Mx.											×
Zizania aquatica L.	*Z. aquatica* Ph.		×									

Table 3. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Torrey, et al, 1819)[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (TORREY, 1819)	LOCALITY[2]										
		1	2	3	4	5	6	7	8	9	10	11
Zizia aptera (Gray) Fern. or *Thaspium trifoliatum* (L.) Gray	*Smyrnium cordatum* (Walt.) Mx.										×	
?	*Asclepias amoena* L.											×
?	*Aster amoenus* Link.										×	
?	*Lathyrus stipulaceus* LC.										×	
?	*Solanum alatum* LC.										×	
?	*Solidago noveboracensis* L.										×	
?	*Viola uliginosa* Muhl.										×	

---

[1] Torrey's nomenclature has not been changed, but more up-to-date nomenclature is given which follows Fernald (1950). Where a binomial is not given under Torrey, the nomenclature is considered identical to that of Fernald. A question mark after Torrey's nomenclature seems to indicate doubt on Torrey's part, while one after Fernald's nomenclature indicates doubt in the mind of the present author about the correct corresponding binomial used by Fernald.

[2] The localities represented by collections include: (1) New Durham cedar swamp; (2) Hackensack Meadows area in general; (3) Bergen; (4) Weehawk cedar swamp; (5) Weehawk meadows, swamps, or wet woods; (6) Weehawk upland habitats; (7) Manhattanville; (8) Elizabethtown; (9) Newark Meadows; (10) Hoboken and/or Greenwich; and (11) New Jersey in general.

TABLE 4. — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889)[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY[2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Acer saccharinum Marsh.																					×
Asclepias viridiflora Raf.	*A. viridiflora* (Raf.) Ell.															×					
Aegopodium podagraria L.																					×
Agastache nepetoides (L.) Ktze.	*Lophanthus nepetoides* (L.) Benth.																	×			×
Agrimonia parviflora Ait.																×					
Aletris farinosa L.														×			×				
Alopecuris aequalis Sobol.	*A. geniculatus* L. var. *aristulatus* (Michx.) Munro.									×											
Ammania coccinea Rothb.		×																			
Amorpha fruticosa L.													×								
Anemone canadensis L.	*Anemone dichotoma* L.											×				×					
Anemone quinquefolia L.	*A. nemorosa* L. forma *quinquefolia* (L.) Britt.	×																			
Aralia hispida Vent.			×																		
Arethusa bulbosa L.		×			×																
Aristolochia serpentaria L.																					×
Asclepias amplexicaulis Sm.	*Asclepias obtusifolia* Michx.														×		×				
Aster nemoralis Ait.		×																			
A. patens Ait. var *phlogifolius* (Muhl.) Nees																					×
Ascyrum hypericoides L.	*Ascyrum crus-andreae* L.									×											
Berberis vulgaris L.																					×
Bidens cernua L.																	×				
B. coronata (L.) Britt.	*Coreopsis trichosperma* Michx.	×			×																
Calamagrostis cinnoides (Muhl.) Bart.	*Deyeuxia nuttalliana* (Steud.) Vasey		×																		
Calla palustris L.		×										×									

TABLE 4. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889)[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY[2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Callitriche heterophylla Pursh (Var. not listed)	*C. heterophylla* Pursh var. *linearis* (Pursh) Austin					×															
Campanula rotundifolia L.																					×
Cardamine pratensis L.		×																			
Carex collinsii Nutt.	*Carex subulata* Michx.															×					×
C. gracillima Schwein.																					×
C. lacustris Willd.	*C. riparia* W. Curtis					×										×					
C. lupulina Muhl. (var. not listed)	*C. lupulina* Muhl. var. *polystachya* Sshw. & Torr.					×															
C. muhlenbergii Schkuhr																	×				
C. platyphylla Carey																					×
C. prasina Wahlemb.		×																			
C. rostrata Stokes var. *utriculata* (Boott) Bailey	*C. utriculata* Boott	×																			
C. tetanica Schkuhr														×							
C. trisperma Dewey			×																		
C. vesicaria L. var. *monile* (Tuckerm.) Fern.	*C. monile* Tuck.														×						
Celtis occidentalis L.																					×
Chamaecyparis thyoides (L.) BSP.		×																		×	
Chamaedaphne calyculata (L.) Moench	*Cassandra calyculata* (L.) Don.		×																		
Cheilanthes lanosa (Michx.) D. C. Eat.																			×		
Chenopodium glaucum L.																					×
Clethra alnifolia L.		×	×																		
Clitoria mariana L.																		×			
Coptis groenlandica (Oeder) Fern.	*Coptis trifolia* (L.) Salisb.	×																			

TABLE 4. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY [2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cornus canadensis L.		×																			
Cuscata compacta Juss.	*Cuscata compacta* L.	×								×									×		
Cynoglossum officinale L.																					×
C. virginianum L.	*Cynoglossum virginicum* L.																				×
Cyperus dentatus Torr.		×																			
C. odoratus L.	*Cyperus speciosus* Vahl															×			×		
Cypripedium reginae Walt.	*Cypripedium spectabile* Sw.																				×
Cystopteris fragilis (L.) Bernh.																					×
Delphinium consolida L. (Gleason, 1963)	*D. Consolida* L.															×					
Desmodium glutinosum (Muhl.) Wood	*Desmodium grandiflorum* (Walt.) DC.																		×		
Diospyros virginiana L.										×											
Dryopteris marginalis (L.) Gray	*Aspidium marginale* (L.) Sw.									×											
Duchesnea indica (Andr.) Focke	*Fragaria indica* Andr.																				×
Eleocharis olivacea Torr.				×													×				
Eleocharis rostellata Torr.				×																	
Equisetum fluviatile L. forma *linnaeanum* (Döll) Broun	*E. limosum* L.																×				
Elymus villosus Muhl.?	*Elymus striatus* Willd.																		×		
Eragrostis capillaris (L.) Nees																		×			
Eriophorum gracile W. D. J. Koch		×																			
Euonymus atropurpureus Jacq.															×						
Eupatorium pilosum Walt.	*Eupatorium teucrifolium* Willd.									×							×		×		
E. sessilifolium L.																	×		×		×
Festuca obtusa Biehler	*F. nutans* Spreng.									×											
Floerkea proserpinacoides Willd.															×						
Fraxinus nigra Marsh.	*Fraxinus sambucifolia* Lam.														×						

TABLE 4. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY [2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Gaultheria hispidula (L.) Bigel.	*Chiogenes hispidula* (L.) T. & G.	×																			
Gentiana saponaria L.	*G. Saponaria* L.				×																
Geranium robertianum L.	*Geranium Robertianum* L.																		×		×
Gerardia purpurea L. forma *albiflora* Britt.																×	×				
Glyceria acutiflora Torr.?	*Glyceria brevifolia* (Muhl.) Schult.														×						
Habenaria blephariglottis (Willd.) Hook.	*H. blephariglottis* (Willd.) Torr.		×																		
H. ciliaris (L.) R. BR.															×						
H. cristata (Michx.) R. Br.		×																			
H. flava (L.) R. Br.	*H. flava* (L.) Gray		×																		
Helianthus decapetalus L.		×																			×
H. giganteus L. (var. not given)	*Helianthus giganteus* L. var. *ambigens* T. & G.		×																		
Heracleum maximum Bartr.	*Heracleum lanatum* Michx.									×											
Hesperis matronalis L.																					×
Hierochloë odorata (L.) Beauv.	*Hieochloë odorata* (L.) Wahl.															×					×
Hydrophyllum virginianum L.	*Hydrophyllum virginicum* L.																		×		×
Hyssopus officinalis L.																×					
Ilex glabra (L.) Gray		×	×																		
I. laevigata (Pursh) Gray			×																		
Impatiens pallida Nutt.	*I. aurea* Muhl.																		×		×
Ipomoea pandurata (L.) Meyer																	×				
Iris prismatica Pursh					×																
I. pseudacorus L.																×					
Juncus marginatus Rostk. (var. not listed)	*J. marginatus* Rostk. var. *paucicapitus* Engelm.									×											

TABLE 4. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY [2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Kosteletzkya virginica (L.) Presl.	*K. virginica* (L.) Gray			×																	
Lactuca hirsuta Muhl. var. *sanguinea* (Bigel.) Fern.	*L. hirsuta* Muhl.																×				
Lactuca floridana (L.) Gaertn. var. *villosa* (Jacq.) Cronq.	*L. villosa* Jacq.																				×
Larix laricina (DuRoi) K. Koch	*Larix laricina* (DuRoi) B. S. P.	×																			
Lathyrus palustris L.															×						
L. palustris L. var. *myrtifolius* (Muhl.) Gray			×	×																	
Lemna minor L. (var not listed)	*Lemna minor* L. var. *obscura* Austin	×																			×
L. minor L. (var. not listed)	*L. minor* L. var. *orbiculata* Austin	×																			
Leucothoë racemosa (L.) Gray		×	×													×					
Liatris spicata (L.) Willd.				×																	
Lilium philadelphicum L.										×											
L. superbum L.					×																
Linnaea borealis L. var. *americana* (Forbes) Rehd.	*Linnaea borealis* L.	×																			
Liparis loeselii (L.) Richard																					×
Lobelia siphilitica L. var. *albiflora* Britt.															×						
Lonicera dioica L.	*Lonicera glauca* Hill		×																		
L. japonica Thunb.							×														
L. sempervirens Ait.		×																			
Lophotocarpus spongiosus (Engelm.) J. G. Sm.	*Sagittaria calycina* Engelm.				×						×										
Lychnis alba Mill.	*L. vespertina* Sibth.																			×	

TABLE 4. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889)[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY[2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Lysimachia hybrida Michx.	*Steironema lanceolatum* (Walt.) Gray var. *hybridum* (Michx.) Gray																			×	
L. thyrsiflora L.		×			×									×							
Lythrum lineare L.			×															×			
Magnolia virginiana L.	*M. glauca* L.	×																			
Malaxis unifolia Michx.	*Microstylis unifolia* (Michx.) B.S.P.	×															×				
Melissa officinalis L.										×											×
Menyanthes trifoliata L.					×									×		×					
var. *minor* Raf.										×											×
Mimulus alatus Ait.										×											
Monarda didyma L.																×	×				
Muhlenbergia capillaris (Lam.) Trin.	*M. capillaris* Kunth.																	×	×		
M. racemosa (Michx.) BSP.																	×				
M. sobolifera (Muhl.) Trin.																			×		
Nemopanthus mucronata (L.) Trel.			×																		
Ophioglossum vulgatum L.																	×				
Origanum vulgare L.																					×
Orontium aquaticum L.														×	×						
Panicum miliaceum L.			×																		
Parnassia glauca Raf.	*Parnasia caroliniana* Michx.																×	×			
Paspalum laeve Michx.															×						
Penstemon hirsutus (L.) Willd.										×											
Phaseolus polystachios (L.) BSP.																		×			
Physalis pubescens L.																					×
Picea mariana (Mill.) BSP.			×																		
Plantago aristata Michx.	*Plantago patogonia* Jacq. var. *aristata* (Michx.) Gray																×				

TABLE 4. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY [2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Poa palustris L.	*Poa serotina* Ehrh.									×											
P. trivialis L.		×								×											
Pogonia ophioglossoides (L.) Ker.				×																	
Polygala brevifolia Nutt.			×																		
P. cruciata L.				×																	
P. paucifolia Willd.		×																			
Polygonum lapathifolium L.	*Polygonum incarnatum* Ell.																×				
Polymnia uvedalia L.	*Polymnia Uvedalia*																				×
Populus heterophylla L.												×				×					×
Potentilla fruticosa L.																					×
Prenanthes racemosa Michx.		×			×														×		
Prunus pensylvanica L.f.	*Prunus pennsylvanica* L.																				×
P. virginiana L.																			×		×
Pycnanthemum muticum (Michx.) Pers.		×								×							×				×
Quercus stellata Wang.	*Q. minor* (Marsh.) Sargent																	×			
Ranunculus pensylvanicus L.f.	*R. pennsylvanicus* L.																			×	
R. septentrionalis Poir.		×												×							
Rhamnus alnifolia L'Her.		×																			
R. caroliniana Walt.		×	×																		
Rhododendron maximum L.		×	×																		
R. viscosum (L.) Torr. forma *glaucum* (Lam.)Voss	*Rhododendron viscosum* (L.) Torr. var. *glaucum* (Lam.) Gray															×					
R. viscosum (L.) Torr. (no variety listed)	*R. viscosum* (L.) Torr. var. *nitidum* (Pursh) Gray															×					
Rhus typhina L.																		×			
Ribes americanum Mill.	*Ribes floridum* L'Her.																		×		
Rorippa islandica (Oeder) Borbas	*Nasturtium palustre* (L.) DC.																				×

TABLE 4. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY [2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
R. islandica (Oeder) Borbas var. *hispida* (Desv.) Butt. & Abbe	*N. palustre* (L.) DC. var. *hispidula* (Desv.) Robinson															×					
Rotala ramosior (L.) Koehne	*Ammania ramosior* L.			×																	
Rubus odoratus L.																			×		×
R. pubescens Raf.	*R. triflorus* Richards	×													×		×				
Rumex orbiculatus Gray	*Rumex Brittanicus* L.		×													×					
R. verticillatus L.		×																×			
Sabatia dodecandra (L.) BSP.	*Sabbatia dodecandra* (L.) B.S.P.				×											×					
Sagina procumbens L.		×				×															
Sagittaria subulata L.	*Sagittaria natans* Michx.										×										
Salix candida Flugge	*Salix candida* Willd	×																			
S. fragilis L.																	×				
S. gracilis Anderss. var. *textoris* Fern.	*S. petiolaris* Smith	×																			
S. viminalis L.																×					
Sambucus pubens Michx.	*S. racemosa* L.																		×		×
Saponaria vaccaria L.																×					
Scirpus atrovirens Willd.	*Scirpus atrovirens* Muhl.																			×	
S. lineatus Michx.										×											
S. olneyi Gray	*S. olneyi* Gray			×																	
S. rubricosus Fern.	*Eriophorum cyperinum* L. var. *laxum* (Gray) B.S.P.									×											
Scleria triglomerata Michx.																	×			×	
Seteria verticillata (L.) Beauv.			×																		
Silene cucubalus Wibel	*S. inflata* Smith	×	×																		
S. caroliniana Walt.	*S. pennsylvanica* Michx.												×								
Smilax glauca Walt.																×					
Smilacina stellata (L.) Desf.	*Unifolium stellatum* (L.) Greene																		×		

TABLE 4. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY [2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Solanum carolinense L.										×											×
Solidago flexicaulis L.	*S. latifolia* L.	×																			
S. elliottii T. & G. var. *ascendens* Fern.			×		×																
S. patula Muhl.		×														×	×				
S. rigida L.																		×			
S. tenuifolia Pursh	*S. caroliniana* (L.) B.S.P.	×																			
S. uliginosa Nutt.	*S. neglecta* T. & G.			×																	
S. ulmifolia Muhl.										×									×		
Sonchus arvensis L.											×										
S. asper (L.) Hill	*Sonchus asper* (L.) Vill.	×																			
Sphenopholis obtusata (Michx.) Scribn.	*Eatonia obtusata* (Michx.) Gray															×					
Staphylea trifolia L.																			×		×
Thalictrum dioicum L.																					×
Tilia neglecta Spach	*T. pubescens* Ait.														×						×
Tipularia discolor (Pursh.) Nutt.	*Tipularia unifolia* (Muhl.) B.S.P.									×											
Tragopogon porrifolius L.																	×				
Trifolium procumbens L.																					×
Trillium undulatum Willd.	*T. erythrocarpum* Michx.	×																			
Trollius laxus Salisb.																×					
Typha angustifolia L.				×																×	
Urtica dioica L.								×													
Utricularia intermedia Hayne		×			×																
Vaccinium atrococcum (Gray) Heller	*V. dismorphum* Bigel.		×													×					
V. corymbosum L. var. *albiflorum* (Hook.) Fern.	*V. corymbosum* L. var. *amoenum* (Ait.) Gray	×	×																		

TABLE 4. (*Continued*) — Species of Plants Reported from the Hackensack Meadows or Surrounding Areas (Britton, 1889) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (BRITTON, 1889)	LOCALITY [2]																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
V. macrocarpon Ait.			×																		
V. oxycoccos L.	*Oxycoccus palustris* Pers.	×														×					
Veronica hederaefolia L.																					×
Viburnum nudum L.				×																	
Viola rafinesquii Greene	*V. tenella* Muhl.																				×
V. pensylvanica Michx.	*V. pubescens* Ait. var. *scabriuscula* T. & G.																				×
Woodsia obtusa (Spreng.) Torr.										×									×		
Woodwardia areolata (L.) Moore									×			×									
W. virginica (L.) Smith						×			×							×					
Xyris flexuosa Muhl.															×		×				
Zizania aquatica L.																				×	

---

[1] Britton's nomenclature has not been changed, but more up-to-date nomenclature is given which follows Fernald (1950). Where a binomial is not given under Britton, the nomenclature is considered identical to that of Fernald. A question mark after Fernald's nomenclature indicates doubt in the mind of the present author as to what is the correct corresponding binomial used by Fernald.

[2] The localities represented by collections include: (1) New Durham; (2) Secaucus; (3) Hackensack Meadows in general; (4) Bergen Meadows; (5) Bergen in general; (6) Schuyler's Corner; (7) Bergen Hill; (8) Bergen Neck; (9) Bergen Point; (10) Fairview; (11) Woodridge; (12) Arlington; (13) Little Ferry; (14) Lyndhurst; (15) Carlstadt; (16) Rutherford; (17) Little Snake Hill; (18) Snake Hill; (19) Newark Meadows; and (20) Weehawkin.

TABLE 5.—Species of Plants Reported from the Hackensack Meadows by Harshberger and Burns in 1919[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (HARSHBERGER AND BURNS, 1919)	LOCALITY OR HABITAT[2]												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Acalypha virginica L.					×									
Acer saccharinum L.		×												
A. saccharum Marsh.		×												
Achillea millefolium L.									×					
Amaranthus retroflexus L.									×					
Ambrosia artemisiifolia L.									×					
A. trifida L.									×					
Amelanchier canadensis (L.) Medic.	*A. oblongifolia* (T. & G.) Roem.				×									
Andropogon gerardi Vitman	*A. furcatus* Muhl.		×											
A. scoparius Michx.			×											
Apocynum cannabinum L.					×								×	
Arctium minus (Hill) Bernh.	*A. minus* Bernh.								×					
Asclepias incarnata var. pulchra (Ehrh.) Pers.											×			
Aster simplex Willd.	*A. paniculatus* Lam.										×			
A. simplex Willd. var. *ramosissimus* (T. & G.) Cronq.	*A. paniculatus* Lam. var. *bellidiflorus* (Willd.) Burgess										×			
Aster tradescanti L.	*A. tradescanti* L.										×			
Avena sativa L.									×					
Betula lenta L.		×												
B. populifolia Marsh.					×									
Bidens coronata (L.) Britt.											×			
B. frondosa L.	*B. trichosperma* (Michx.) Britton										×			
Bulbostylis capillaris (L.) C. B. Clarke	*Stenophyllus capillaris* (L.) Britton	×												
Calamagrostis canadensis (Michx.) Nutt.	*C. canadensis* (Michx.) Beauv.		×											
Calopogon pulchellus (Salisb.) R.Br.	*C. pulchellus* (Sw.) R.Br.			×										
Celastrus scandens L.			×											
Celtis occidentalis L.		×												
Chenopodium album L.									×					

TABLE 5. (*Continued*) — Species of Plants Reported from the Hackensack Meadows by Harshberger and Burns in 1919[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (HARSHBERGER AND BURNS, 1919)	LOCALITY OR HABITAT[2]												
		1	2	3	4	5	6	7	8	9	10	11	12	13
C. ambrosioides L.									×					
Chrysanthemum leucanthemum L.	*C. leucanthemum* L.								×					
Cichorium intybus L.	*Cichorium Intybus* L.								×					
Cicuta maculata L.											×			
Cirsium vulgare (Savi) Tenore	*Cirsium lanceolatum* (L.) Hill								×					
Clethra alnifolia L.						×								
Collinsonia canadensis L.		×												
Commelina communis L.													×	
Convolvulus arvensis L.									×					
C. sepium L.														×
Cornus amomum Mill.	*C. Amomum* Mill.				×									
C. racemosa Lam.	*C. paniculata* L'Her.	×												
Cuscuta compacta Juss.											×			
C. gronovii Willd.	*C. Gronovii* Willd.										×			
Cyperus filicinus Vahl	*C. Nuttalii* Eddy										×			
C. filiculmis Vahl		×												
C. strigosus L.													×	
Dactylis glomerata L.									×					
Datura stramonium L.									×					
Daucus carota L.	*D. Carota* L.								×					
Desmodium canadense (L.) DC.	*D. canadense* L.									×				
Digitaria sanguinalis (L.) Scop.	*Digitaria sanguinalis* L. Scop.								×					
Echinochloa walteri (Pursh) Nash											×			
Echium vulgare L.									×					
Eleusine indica Gaertn.									×					
Epilobium angustifolium L.										×				
Epilobium hirsutum L.									×					
Equisetum arvense L.													×	

TABLE 5. (*Continued*) — Species of Plants Reported from the Hackensack Meadows by Harshberger and Burns in 1919[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (HARSHBERGER AND BURNS, 1919)	LOCALITY OR HABITAT[2]												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Eragrostis pilosa (L.) Beauv.									×					
Eupatorium perfoliatum L.											×			
E. purpureum L.											×			
E. sessilifolium L.		×												
Euphorbia maculata L.	*E. preslii* Guss.				×									
Euphorbia supina Raf.	*E. supina* Raf.								×					
Fraxinus americana L.										×				
Galinsoga parviflora Cav.									×					
Gerardia purpurea L.			×											
Gleditsia triacanthos L.											×			
Habenaria ciliaris (L.) R.Br.				×										
Hamamelis virginiana L.		×												
Helianthus annuus L.													×	
H. divaricatus L.										×				
H. giganteus L.											×			
Humulus lupulus L.	*H. Lupulus* L.												×	
Hystrix patula Moench		×												
Impatiens capensis Meerb.	*I. biflora* Walt.										×			
Juglans cinerea L.		×												
Juncus tenuis Willd.										×				
Lactuca biennis (Moench) Fern.	*L. spicata* (Lam.) Hitch.												×	
Lactuca scariola L.									×					
Leersia virginica Willd.		×												
Lepidium virginicum L.									×					
Lespedeza intermedia (S. Wats.) Britt.			×											
L. hirta L.			×											
Lilium philadelphicum L.		×												
L. superbum L.											×			

Table 5. (*Continued*) — Species of Plants Reported from the Hackensack Meadows by Harshberger and Burns in 1919[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (HARSHBERGER AND BURNS, 1919)	LOCALITY OR HABITAT[2]												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Linaria vulgaris Hill									×					
Liquidambar styraciflua L.		×												
Lobelia siphilitica L.							×							
Ludwigia alternifolia L.	*Ludvigia alternifolia* L.		×											
Lycopodium alopecuroides L.				×										
Medicago sativa L.									×					
Melilotus alba Desr.									×					
M. officinalis (L.) Lam.									×					
Menyanthes trifoliata L. var. *minor* Raf.				×										
Nepeta cataria L.	*N. Cataria* L.							×	×					
Oenothera biennis L.									×					
Osmunda regalis L. var. *spectabilis* (Willd.) Gray	*Osmunda regalis* L.				×									
Panicum capillare L.										×				
P. dichotomiflorum Michx.		×											×	
P. lanuginosum Ell. var. *fasciculatum* (Torr.) Fern.	*P. huachucae* Ash.	×												
P. virgatum L.														×
Parnassia glauca Raf.	*P. caroliniana* Michx.			×										
Parthenocissus quinquefolia (L.) Planch.	*Psedera quinquefolia* (L.) Greene									×				
Phytolacca americana L.	*Phytolacca decandra* L.												×	
Plantago lanceolata L.									×					
P. major L.									×					
Pogonia ophioglossoides (L.) Ker.				×										
Polygonum arifolium L.											×			
P. aviculare L.													×	
P. convolvulus L.	*P. Convolvulus* L.												×	
P. hydropiper L.	*P. Hydropiper* L.											×		
P. lapathifolium L.												×		

TABLE 5. (*Continued*) — Species of Plants Reported from the Hackensack Meadows by Harshberger and Burns in 1919[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (HARSHBERGER AND BURNS, 1919)	LOCALITY OR HABITAT[2]												
		1	2	3	4	5	6	7	8	9	10	11	12	13
P. orientale L.													×	
P. pensylvanicum L.	*P. pennsylvanicum* L.										×			
P. persicaria L.	*P. Persicaria* L.											×		
P. sagittatum L.											×			
P. scandens L.														×
Populus grandidentata Michx.										×				
Potentilla norvegica L.	*P. monspeliensis* L.								×					
P. simplex Michx.	*Potentilla canadensis* var. *simplex* (Michx.) T. & G.									×				
Prenanthes alba L.										×				
Prenanthes trifoliolata (Cass.) Fernald		×												
Prunus serotina Ehrh.										×				
Pycnanthemum virginianum (L.) Durand & Jackson			×											
Pyrus arbutifolia (L.) L.f.											×			
P. melanocarpus (Michx.) Willd.											×			
Quercus alba L.										×				
Q. bicolor Willd.											×			
Q. prinus L.	*Q. Prinus* L.	×	×											
Q. velutina Lam.										×				
Rhododendron viscosum (L.) Torr.						×								
Rhus typhina L.			×											
Rosa carolina L.	*R. humilis* Marsh.				×									
Rudbeckia laciniata L.											×			
Rumex orbiculatus Gray	*R. Britannica* L.										×			
Sabatia dodecandra (L.) BSP.				×										
S. stellaris Pursh	*Sabbatia stellaris* Pursh	×	×											
Salix babylonica L.						×								
S. cordata Michx.	*S. cordata* Muhl.				×									

TABLE 5. (*Continued*) — Species of Plants Reported from the Hackensack Meadows by Harshberger and Burns in 1919 [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (HARSHBERGER AND BURNS, 1919)	LOCALITY OR HABITAT [2]												
		1	2	3	4	5	6	7	8	9	10	11	12	13
S. nigra Marsh.		×												
Sambucus canadensis L.														×
Sanguisorba canadensis L.											×			
Saponaria officinalis L.									×					
Sassafras albidum (Nutt.) Nees.	*Sassafras variifolium* (Salisb.) Ktze.	×												
Scirpus rubricosus Fern.											×			
Scrophularia lanceolata Pursh	*Scrophularia leporella* Bicknell	×												
Setaria glauca (L.) Beauv.													×	
Sicyos angulatus L.											×			
Silene stellata (L.) Ait.		×												
Sisymbrium altissimum L.													×	
Smilacina racemosa (L.) Desf.		×	×											
Solanum dulcamara L.	*S. Dulcamara* L.								×					
Solidago altissima L.										×				
S. bicolor L.		×	×											
S. canadensis L.										×				
S. graminifolia (L.) Salisb. var. *nuttallii* (Greene) Fern.	*Solidago graminifolia* (L.) Salisb.									×				
S. nemoralis Ait.		×	×											
S. rigida L.			×											
S. uliginosa Nutt.	*S. neglecta* Torr. & Gray										×			
S. ulmifolia Muhl.		×												
Sonchus asper (L.) Hill									×					
Sorghastrum nutans (L.) Nash			×											
Spartina cynosuroides (L.) Roth											×			
Spiraea tomentosa L.					×									
Taraxacum officinale Weber									×					
Teucrium canadense L. (var. not given)	*T. canadense* L. var. *littorale* (Bicknell) Fern.										×			

TABLE 5. (*Continued*) — Species of Plants Reported from the Hackensack Meadows by Harshberger and Burns in 1919[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (HARSHBERGER AND BURNS, 1919)	LOCALITY OR HABITAT[2]												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Thalictrum polygamum Muhl.					×									
Tovara virginiana (L.) Raf.	*Polygonum virginianum* L.	×												
Trifolium arvense L.									×					
T. pratense L.									×					
T. procumbens L.									×					
T. repens L.									×					
Triosteum perfoliatum L.		×												
Tussilago farfara L.	*T. Farfara* L.											×		
Ulmus americana L.		×												
Utricularia intermedia Hayne					×									
Vaccinium corymbosum L.						×								
V. vacillans Torr.	*V. vacillans* Kalm	×												
Verbascum blattaria L. var. *albiflora* (Don) House	*V. blattaria* var. *albiflorum* Ktze.										×			
V. thapsus L.	*V. Thapsus* L.										×			
Verbena hastata L.							×							
Vernonia noveborascensis Willd.	*V. noveborascensis* (L.) Michx.										×			
Viburnum rafinesguianum Schultes			×											
V. prunifolium L.									×					
Vitis aestivalis Michx.		×												
Xanthium italicum Moretti	*X. commune* Britt.											×		

[1] The nomenclature used by Harshberger and Burns has not been changed, but more up-to-date nomenclature is also given (Fernald, 1950). Where a binomial is not given under Burns, the nomenclature is considered identical to that of Fernald (1950).

[2] The localities represented by collections include: (1) Snake Hill; (2) Little Snake Hill; (3) Moonachie; (4) Belleview Turnpike; (5) Secaucus; (6) Schuyler's Corner; and (7) Harrison Turnpike. Habitats of areas where collections were made in the Hackensack Meadows in general include: (8) dry habitat with ruderal species; (9) upland habitat with non-ruderal species; (10) lowland habitat with non-ruderal species; (11) wet habitat with ruderal species; (12) wet or dry habitat with ruderal species; and (13) upland or lowland habitat with non-ruderal species.

TABLE 6. — Species of Plants Reported from the Hackensack Meadows at Secaucus by Heusser in 1949 (List not Complete) [1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (HEUSSER, 1949)	HABITAT [2]			
		1	2	3	4
Agrostis hyemalis (Walt.) BSP				×	
Ambrosia artemisiifolia L.					×
Amelanchier canadensis (L.) Medic.	*Amelanchier oblongifolia* (T. & G.) Roem.	×			
Apios americana Medic.	*Apios tuberosa* Moench	×			
Asclepias incarnata L. var. *pulchra* (Ehrh.) Pers.			×		
Betula populifolia Marsh.		×			
Bidens coronata (L.) Britt.	*B. tricosperma* (Michx.) Britton		×		
Boehmeria cylindrica (L.) Sw.			×		
Convolvulus sepium L.				×	
Cuscuta compacta Juss.			×		
Cyperus strigosus L.			×		
Dryopteris thelypteris (L.) Gray	*Aspidium thelypteris* (L.) Sw.		×		
Erechtites hieracifolia (L.) Raf.					×
Eupatorium perfoliatum L.			×		
E. purpureum L.			×		
Glyceria striata (Lam.) Hitch.	*G. nervata* (Willd.) Trin.		×		
Helianthus giganteus L.			×		
Hemerocallis fulva L.					×
Impatiens capensis Meerb.	*I. biflora* Walt.		×		
Lycopus uniflorus Michx.			×		
Lysimachia thyrsiflora L.			×		
Maianthemum canadense Desf.		×			
Mikania scandens (L.) Willd.			×		
Nyssa sylvatica Marsh.			×		
Onoclea sensibilis L.			×		
Panicum virgatum L.				×	
Phragmites australis (Cav.) Trin. ex Steudel [3]	*P. communis* Trin.			×	
Phytolacca americana L.	*P. decandra* L.				×
Pilea pumila (L.) Gray			×		

TABLE 6. (*Continued*) — Species of Plants Reported from the Hackensack Meadows at Secaucus by Heusser in 1949 (List not Complete)[1]

NOMENCLATURE (FERNALD, 1950)	NOMENCLATURE (HEUSSER, 1949)	HABITAT[2]			
		1	2	3	4
Polygonum arifolium L.			×		
P. coccineum Muhl.	*P. muhlenbergii* (Meisn.) Wats.		×		
P. punctatum Ell.	*P. acre* HBK.		×		
P. sagittatum L.			×		
P. scandens L.				×	
Prunus serotina Ehrh.		×			
Pyrus floribunda Lindl.	*P. arbutifolia* (L.) L.f. var. *atropurpurea* (Britton) Robinson			×	
Quercus bicolor Willd.			×		
Q. palustris Muenchh.			×		
Q. rubra L.		×			
Rhamnus frangula L.					×
Rhus radicans L.	*R. toxicodendron* L.			×	
Rorippa islandica (Oeder) Borbas var. *hispida* (Desv.) Butt. & Abbe	*Radicula palustris* (L.) Moench var. *hispida* (Desv.) Robinson		×		
Rosa carolina L.		×			
?	*Rubus* sp. (could be a lowland species)	×			
Rumex orbiculatus Gray	*R. britannica* L.		×		
Sambucus canadensis L.				×	
Solanum dulcamara L.					×
Solidago elliottii T. & G. var. *ascendens* Fern.	*S. elliottii* T. & G.		×		
S. gigantea Ait. var. *leiophylla* Fern.	*S. serotina* Ait.		×		
S. graminifolia L.		×			
Spartina pectinata Link	*Spartina michauxiana* Hitch.		×		
Thalictrum polygamum Muhl.			×		
Viburnum dentatum L.				×	
V. prunifolium L.		×			
Viola pallens (Banks) Brainerd		×			
Vitis labrusca L.		×			

---

[1] Heusser's nomenclature has not been changed but more up-to-date nomenclature has been given (Fernald, 1950). Where a binomial is not given under Heusser, the nomenclature is considered identical to that of Fernald (1950).

[2] Habitats of areas where collections were made at Secaucus include: (1) upland habitat with non-ruderal species; (2) lowland habitat with non-ruderal species; (3) lowland or upland habitat with non-ruderal species; (4) mostly dry habitat with ruderal species.

[3] Nomenclature follows Clayton, 1968.

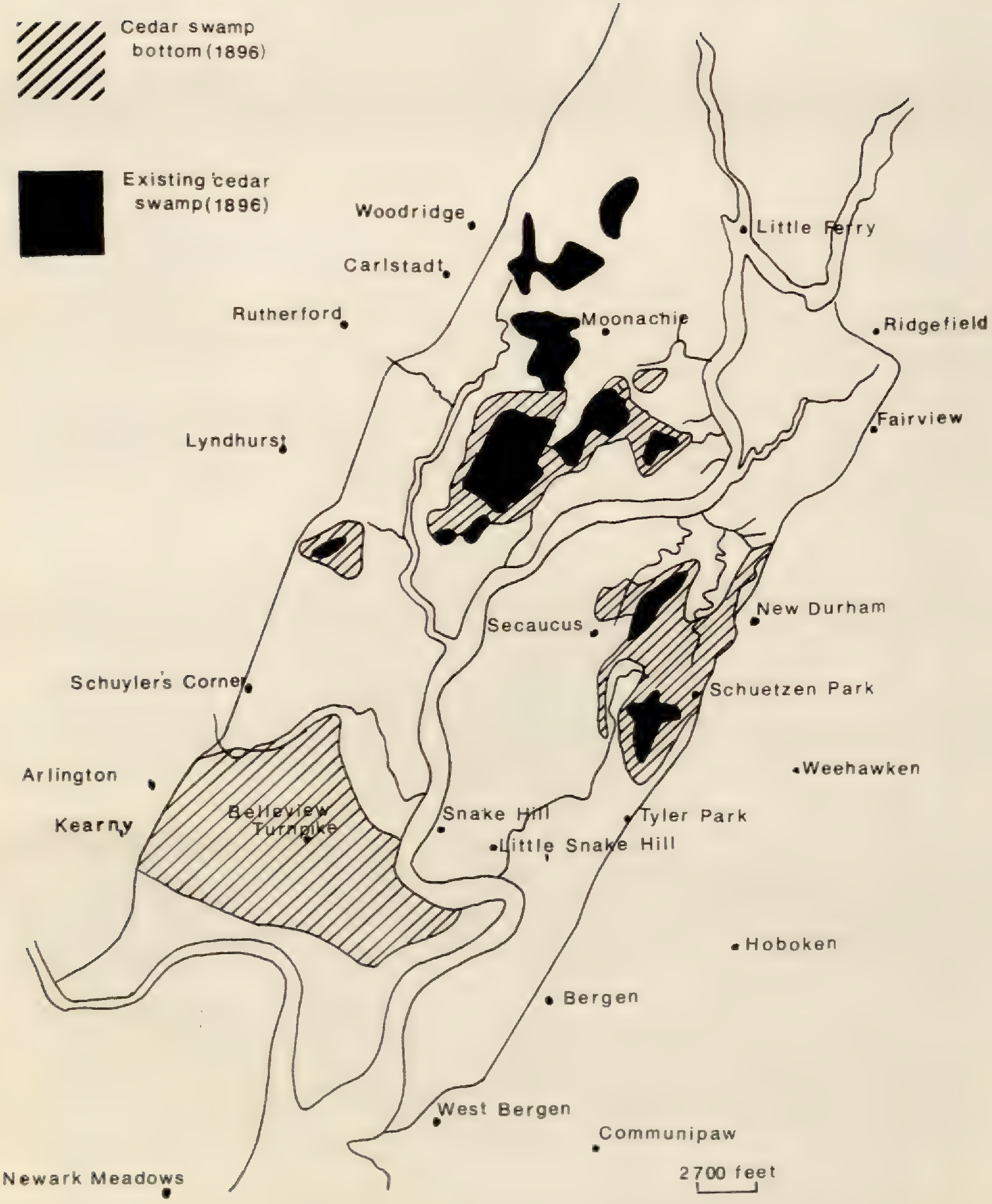

Cedar swamp bottom (1896)
Existing cedar swamp (1896)
Woodridge
Carlstadt
Rutherford
Little Ferry
Moonachie
Ridgefield
Fairview
Lyndhurst
New Durham
Secaucus
Schuyler's Corner
Schuetzen Park
Arlington
Weehawken
Kearny
Belleview Turnpike
Snake Hill
Tyler Park
Little Snake Hill
Hoboken
Bergen
West Bergen
Communipaw
Newark Meadows
2700 feet

FIGURE 1. Map of Hackensack Meadows (Vermeule, 1896) indicating collection localities of various botanists.

MARSH TYPES
PHRAGMITES AUSTRALIS
SPARTINA ALTERNIFLORA–AMARANTHUS CANNABINA
SPARTINA PATENS–ATRIPLEX PATULA–SALICORNIA EUROPAEA
TYPHA ANGUSTIFOLIA
PLUCHEA PURPURASCENS
FOREST TYPES
QUERCUS PALUSTRIS–QUERCUS BICOLOR–ACER RUBRUM
AILANTHUS ALTISSIMA
Herb–Shrub Thicket
QUERCUS–CARYA
MEADOW TYPES
ANDROPOGON VIRGINICUS
PANICUM VIRGATUM
PANICUM VIRGATUM–Ruderal Species
PANICUM VIRGATUM–SOLIDAGO Species
PANICUM VIRGATUM–CALAMAGROSTIS CANADENSIS
SOLIDAGO Species
RUDERAL SPECIES
DEVELOPED LAND
WATER
"A"
"B"
"C"
SCALE 1:24000
0
2000
4000
FEET

VEGETATION
OF THE
HACKENSACK MEADOWS
BY
WILLIAM SIPPLE

Morphological and Anatomical Differences in Leaf Blades of Three North American Aquatic Bulrushes (Cyperaceae: *Scirpus*)

ALFRED E. SCHUYLER
Department of Botany
Academy of Natural Sciences of Philadelphia

Groups of closely-related sedge species are usually distinguished from one another by inflorescence, spikelet, scale, and achene characteristics. Ordinarily, taxonomists emphasize these characteristics more than those of leaves, culms, rhizomes, and roots. It is now apparent that anatomical characteristics of these vegetative plant structures are fundamental to our understanding of taxonomic relationships among genera and species in the Cyperaceae. This point is demonstrated by three closely-related North American aquatic bulrushes, *Scirpus etuberculatus* (Steud.) Ktze., *Scirpus torreyi* Olney, and *Scirpus subterminalis* Torr., which are very similar on the basis of traditional characteristics (Koyama, 1962), but differ substantially in the morphology and anatomy of their leaf blades.

MATERIAL AND METHODS

Fresh material of all three species was collected in vials of water in the field. Dried material was also obtained from herbarium specimens preserved at the Academy of Natural Sciences in order to determine the reliability of anatomical characteristics over a large geographical area and under different ecological conditions. Portions of leaf blades and involucral bracts were removed at a point mid-way between the base and tip of the blade or bract and soaked in tap water for one day before sectioning free-hand with razor blades. Individual sections were then mounted on microscope slides in Hoyer's Solution. In the case of dried herbarium material, the portions were soaked in detergent water for a few days before handling in the above manner.

CHARACTERISTICS OF THE SPECIES

Scirpus etuberculatus occurs mostly on the Coastal Plain from Delaware to eastern Texas with one disjunct locality in southern Missouri (Steyermark, 1963), while the northern *Scirpus torreyi* occurs from eastern Quebec to the mountains of Virginia and westward to Manitoba, South Dakota, and Missouri. *Scirpus subterminalis* is a wide-ranging species with two main areas of distribution: from Newfoundland to Georgia and westward to Minnesota and Missouri in eastern North America, and from southern Alaska to Oregon and eastward to Montana in western North America. All three species grow in lakes, ponds, and streams, but *S. etuberculatus* and *S. subterminalis* often grow in swiftly flowing water while *S. torreyi* is mostly restricted to deadwater or slowly flowing water.

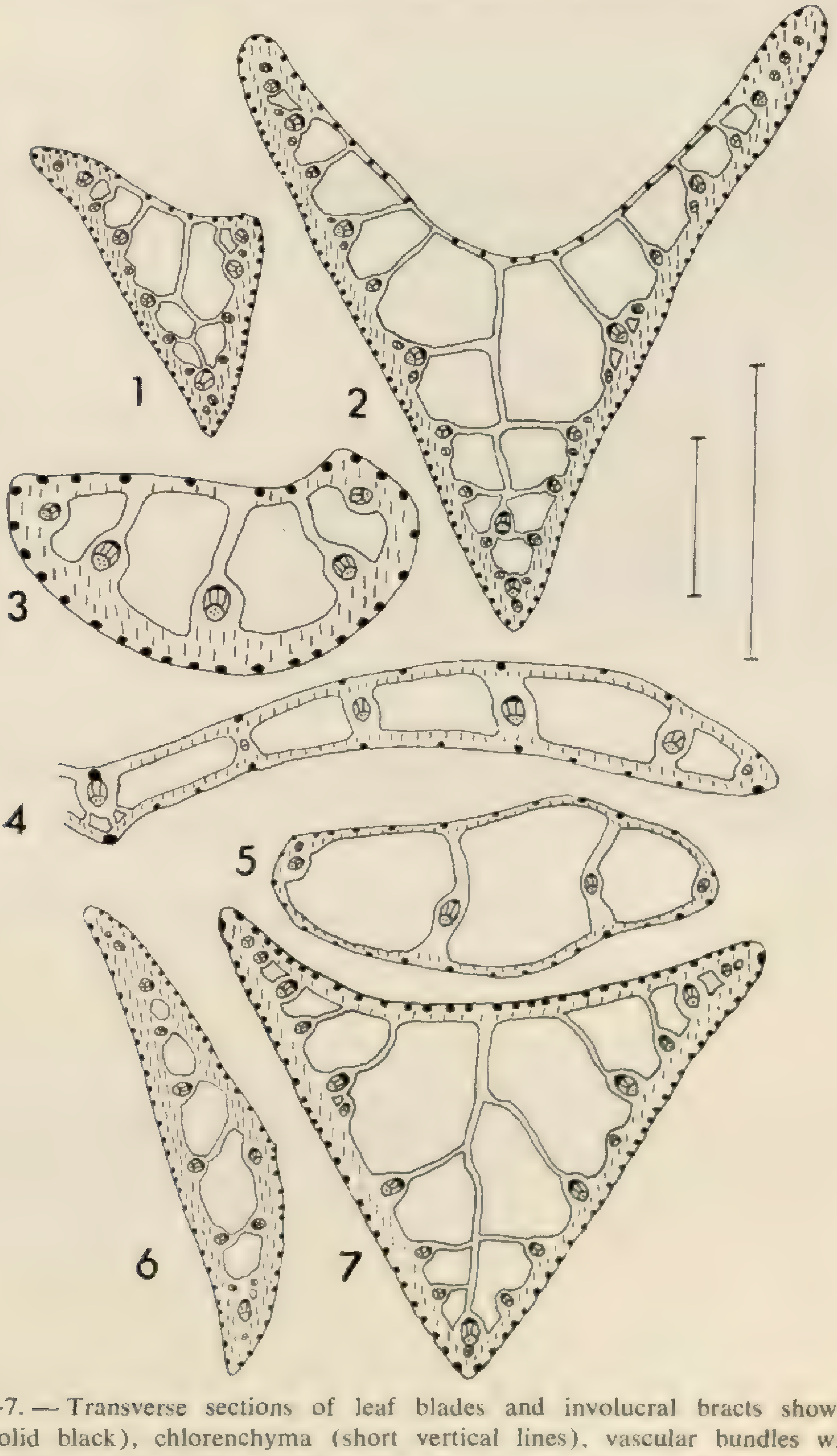
Scirpus etuberculatus has ribbon-like underwater leaf blades (Fig. 4) and triangular-channeled emergent and above water blades (Fig. 7). The comparatively open pseudo-lateral inflorescence contains 4-16 spikelets. *S. torreyi* does not have such strongly dimorphic underwater and emergent leaf blades, although in submerged plants, the sheaths often elongate considerably. Leaf blades of *S. torreyi* are usually emergent and triangular-channeled (Fig. 2) and the compact pseudo-lateral inflorescence contains 1-4 spikelets. *S. subterminalis* has crescentform-capillary underwater leaf blades (Fig. 5) and the pseudo-lateral inflorescence consists of a single spikelet. On occasional terrestrial plants, the blades (Fig. 3) are similar to underwater blades except for being shorter and more rigid. For more details concerning morphological characteristics of these species and their distinctions from other species of *Scirpus,* regional floras such as Gray's Manual (Fernald, 1950), the New Britton and Brown Illustrated Flora (Gleason, 1952), or the Flora of Missouri (Steyermark, 1963), may be consulted.

Both *S. etuberculatus* (Figs. 4 + 7) and *S. subterminalis* (Figs. 3 + 5) have chlorenchyma on the abaxial and adaxial sides of leaf blades. In both species, adaxial chlorenchyma is not as well developed as abaxial chlorenchyma. In contrast, *S. torreyi* (Figs. 1 + 2) has chlorenchyma restricted to the abaxial sides and only near the margins of the adaxial sides. The emergent and above water leaf blades of *S. etuberculatus* have stomates throughout the adaxial and abaxial epidermis while emergent and above water blades of *S. subterminalis* and *S. torreyi* have stomates restricted to the abaxial epidermis and portions of the adaxial epidermis close to the margin.

Involucral bracts, which are modified leaf blades, are essentially the same as emergent and above water leaf blades except for more variation in shape. The basically triangular involucral bracts of *S. etuberculatus* (Fig. 6) often become nearly crescentform in transverse section because of the unequal length of the abaxial sides of the bracts from the midrib to the opposite margins. This is also the situation in *S. torreyi* (Fig. 1) except it usually is not so pronounced. In *S. subterminalis* the bracts closely resemble the leaf blades of terrestrial plants.

For the aid of taxonomists who may have difficulty identifying these species with keys based on characteristics of the inflorescence, spikelets, scales, and achenes, the following key based on the morphology and anatomy of leaf blades and involucral bracts is provided:

1. Plants having chlorenchyma on adaxial and abaxial sides of leaf blades and involucral bracts, underwater blades usually well-developed 2
1. Plants having chlorenchyma restricted to abaxial sides of leaf blades and involucral bracts except near margins of adaxial sides, usually lacking well-developed underwater blades .... *S. torreyi*
    2. Underwater blades ribbon-like, emergent and above water blades triangular-channeled with stomates throughout adaxial and abaxial epidermis ...... *S. etuberculatus*
    2. Underwater blades crescentform-capillary, emergent and above water blades similar to underwater blades, stomates restricted to abaxial epidermis and portions of adaxial epidermis near margins .... *S. subterminalis*



FIGS. 1-7. — Transverse sections of leaf blades and involucral bracts showing sclerenchyma (solid black), chlorenchyma (short vertical lines), vascular bundles with xylem (lined) and phloem (stippled), and air cavities (empty space separated from other tissue). Fig. 1. Involucral bract of *S. torreyi;* Fig. 2. Emergent leaf blade of *S. torreyi;* Fig. 3. Above water blade of *S. subterminalis;* Fig 4. Portion of underwater leaf blade including midrib and one margin of *S. etuberculatus;* Fig. 5. Underwater blade of *S. subterminalis;* Fig. 6. Involucral bract of *S. etuberculatus;* Fig. 7. Emergent leaf blade of *S. etuberculatus.* The large unit is a mm scale for Figs. 3, 4. and 5; the smaller one is a mm scale for 1, 2, 6, and 7.

The above characteristics confirm the distinctiveness of each of these closely-related species and also provide a means for identifying plants lacking mature inflorescences.

ACKNOWLEDGMENTS

I am grateful to John Braxton and Karen Keil for preparing sections of leaf blades and involucral bracts for microscopic examination, Patricia Schuyler for helping with drawings, and Helena Greenwood for typing the manuscript.

LITERATURE CITED

FERNALD, M. L. 1950. Gray's Manual of Botany. 8th ed. American Book Co., New York. lxiv + 1632 pp.

GLEASON, H. A. 1952. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. New York Botanical Garden, New York. 3 v.

KOYAMA, T. 1962. The Genus *Scirpus* Linn., Some North American Aphylloid Species. Canad. Jour. Bot., 40:913-937.

STEYERMARK, J. A. 1963. Flora of Missouri. Iowa State University Press, Ames. lxxxiii + 1725 pp.

Marsilea quadrifolia L. in Delaware County, Pennsylvania

FLORENCE M. GIVENS AND WAYNE FERREN
Department of Botany
Academy of Natural Sciences of Philadelphia

During last summer's field work, while visiting aquatic habitats with Dr. A. E. Schuyler, we found an extensive colony of *Marsilea quadrifolia* along Ridley Creek, just off Baltimore Pike, on the boundary between Upper Providence and Middletown Townships in Delaware County, Pennsylvania.

This introduced water-clover occasionally appears in sluggish streams in the United States. In our local herbarium, *Marsilea* is represented by two Pennsylvania collections. The earliest is by M. E. and A. N. Leeds in 1894 at Crum Lynne in Delaware County. In 1945, Dr. E. T. Wherry found it in a pond northeast of Wallingford, also in Delaware County. In the Academy's general herbarium there is only one Pennsylvania specimen from outside the local area. It was collected in 1941 at La Bar's Rhododendron Nursery, Stroudsburg, Monroe County, where it may have been introduced into the pond by the owners.

A specimen from the extensive Ridley Creek colony was deposited in the Herbarium of the Philadelphia Botanical Club at the Academy of Natural Sciences of Philadelphia.

Phylogenetic, Biochemical, and Morphological Studies With Some Living Specimens of Naturally Extinct or Relictual *Styrax* Species

JAMES A. MEARS
Department of Botany
Academy of Natural Sciences of Philadelphia

INTRODUCTION

At the Henry Foundation for Botanical Research in Gladwyne, Pennsylvania, there is a unique collection of native American plant species, primarily from the eastern and southern United States. Mrs. Mary G. Henry searched diligently for rare species and unusual color forms of shrubs, trees and other perennials. Several taxa which have disappeared from their only reported natural sites are growing and flowering on the grounds of the Henry Foundation. Of particular interest are the fine collections of southern and eastern *Styrax*. All of the well-documented taxa east of western Texas grow in similar environments at the Henry Foundation.

Until recently only *Styrax pulverulenta* Michaux was easily located in Texas. *Styrax platanifolia* Engelmann and *S. platanifolia* v. *stellata* Cory had been lost and presumed extinct by some. Recently some specimens of *Styrax grandifolia* Aiton have been identified from near the Louisiana border in Texas; and one of the *Styrax platanifolia* varieties has been relocated. The living *Styrax* collection from Texas consists of all the above-mentioned taxa plus one additional specimen of great peculiarity.

Since the Henry Foundation Garden provides the only opportunity to study nearly all, if not all, the known *Styrax* spp. of Texas in similar environmental conditions, I undertook a morphological study and a rather simple pattern analysis of phenolics.

MATERIALS AND METHODS

Leaf, stem, flower and fruit material was collected when possible at three times during 1971. Each organ type was studied separately for each collection date. Each portion was ground in a blender in 80% aqueous methanol, applied to Whatman 3 MM chromatography paper, and developed by the usual methods of two dimensional descending paper chromatography (3:1:1::t-butanol: acetic acid:water and 15% acetic acid). Phenolic constituents absorptive or fluorescent in UV light were noted on diagrammatic charts.

The morphological investigations were macroscopic and binocular microscopic observations of the materials used for extraction.

The material studied is enumerated in Table 1. In addition to the available Texas material, three living specimens of the two other southeastern *Styrax* were studied.

TABLE 1. — Enumeration and Location of Material Studied.

Henry Foundation Number	Location
103	probably Georgia
111	“Big Bend, on mountainside, 1956”
217	Blanco, Texas
407	Warm Springs, Georgia, 1945
731	Vanderpool, Texas, 1953
1052	Cuthbert, Georgia
1338	probably Louisiana
1340	Vanderpool, Texas

MORPHOLOGICAL OBSERVATIONS

Descriptions of the Henry Foundation specimens are given here to provide details rarely, if ever, published about certain *Styrax* species.

103. Bark simple. Leaves ovate-oblanceolate, acute, with small, sharp dentations; ca 2-3 cm wide by 8-9 cm long; glabrous above and below. Inflorescence of 3-4 nearly white, rotate flowers. Calyx very slightly zygomorphic, with 6 moderately large acute sepal lobes arising as dentations from the fused calyx; glabrous. Petals narrow, short (⅜″ long), apparently not overlapping; slightly pubescent. Filaments glabrous, anthers yellow. Style pubescent on lowest 3-5%. Fruits small (¼″ diameter); ovoid; apiculate; hispid, with short pubescence.

111. Bark stringy. Leaves ovate-lanceolate, acute, with very small unextended dentations; glabrous above and very slightly pubescent on the main veins below; 5-6 cm wide by 11-14 cm long. Inflorescence of 1-4 flowers. Flowers salverform; showy. Calyx slightly zygomorphic, appearing tightly stretched with 6 small calyx lobes appearing as dentations; pubescent. Petals large (to ⅝″ long), overlapping; slightly pubescent. Filaments densely pubescent on lowest ½. Anthers yellow. Style essentially glabrous. Fruits small (¼″ by ⅜″); oblong; apiculate; with long, dense pubescence.

217. Bark stringy. Leaves ovoid with somewhat irregular lobes; basally attenuate; equal stellate pubescence above and below; 6-8 cm wide by 6-8 cm long. Inflorescence of 3-5 campanulate flowers. Calyx slightly zygomorphic, with 6 extended calyx dentations (lobes); hispid, ciliate-glandular. Petals (6) fused basally and overlapping; ⅝-¾″ long. Filaments pubescent on lowest 40%; tube free of corolla. Anthers orange. Style pubescent on lowest 10-20%. Fruits pubescent.

407. Leaves ovate-lanceolate, acute, with very small dentations; glabrous above and pubescent below; 6-7 cm wide by 10-12 cm long. Inflorescence of about 10 rotate flowers. Calyx strongly zygomorphic (bilaterally symmetrical); densely pubescent. Petals short (½″); pubescent. Filaments pubescent on lowest 80%. Anthers yellow-orange. Style glabrous. Fruits ⁵⁄₁₆″ wide by ⅜″ long; hispid.

731. Bark stringy. Leaves ovate, with irregular undulations (lobes); 7-8 cm in diameter; glabrous above and below. Inflorescence pendulous; with 3-5 campanulate flowers. Calyx slightly zygomorphic; glabrous with ciliate-glandular calyx lobes; brown. Petals (6) ¾″ long; slightly pubescent; basally fused; overlapping in bud. Filament tube pubescent and fused to corolla; filaments pubescent on lowest 10%. Anthers yellow-orange. Style pubescent on lowest 30%. Stigma slightly bilobed. Fruits pubescent.

1052. Leaves oblong-ovate, without dentations; 10-12 cm long by 6-8 cm wide; glabrous above and pubescent below. Inflorescence of about 10 rotate flowers. Calyx strongly zygomorphic; densely pubescent. Petals short; very slightly pubescent. Filaments pubescent to the top. Anthers yellow-orange. Fruits ovate, apiculate (⅜″ in diameter); hispid.

1338. Bark slightly stringy. Leaves ovate-lanceolate, acute, with inconspicuous dentations; 3-4 cm long by 7 cm wide; glabrous above and pubescent below. Inflorescence of 2-4 rotate flowers. Calyx very slightly zygomorphic, with very small, simple dentations (lobes); with dense, stellate pubescence. Petals ¼″-⅜″ long; fused basally; pubescent; overlapping. Filaments fused basally to corolla; pubescent on lowest 20%. Anthers yellow-orange. Style pubescent on lowest 2-5%. Fruits ¼″ in diameter; pubescent.

1340. Not distinct from 731.

RESULTANT CHEMICAL PATTERNS

A total of 14 components were well-detected by paper chromatographic techniques. Their rf's in 3:1:1::t-butanol:acetic acid:water and in 15% acetic acid are given with their distribution in the various collections in Table 2. There was no significant variation in phenolic patterns with the various leaf developmental stages tested.

TABLE 2. — Opaque flavonoid constituents of *Styrax* species examined.[a]

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
	.57	.58	.70	.67	.45	.60	.35	.23	.14	.55	.79	.91	.50	.81
Number	.38	.72	.76	.82	.46	.50	.75	.70	.66	.50	.17	.09	.35	.40
103	+	+	+	+	+									
111	+		+			+	+					+	+	
217	+					+	+	+		+				
407	+	+		+	+	+	+			+				
731	+				+	+	+	+	+					
1052	+	+		+	+	+		+		+			+	+
1338	+			+	+	+	+	+			+			
1340					+	+	+			+	+			

[a] The first fraction is the rf in the butanol solvent and the second is the rf in 15% acetic acid.

DISCUSSION

Despite the limitations on accuracy necessitated by studies of small populations, it seems clear that several morphological and chemical entities exist among the *Styrax* from the southeastern United States, particularly in Texas.

In Table 3 the most reliable paper chromatographic spots are given (from Table 2). Several other spots were of such slight concentration that their systematic detection is open to doubt. Also in Table 3, the *Styrax* collections are arranged according to chemical similarities.

TABLE 3. — Useful chemical characters from Table 2.

Number	I	II	IV	V	VI	VII	VIII	X	XIII
103	+	+	+	+					
401	+	+	+	+	+	+		+	
1052	+	+	+	+	+		+	+	+
1338	+		+	+	+	+	+		
731	+			+	+	+	+		
111	+			+	+	+			+
217	+				+	+	+	+	
1340				+	+	+		+	

Seven of the collections are easily correlated with known *Styrax* taxa and are determined as follows: 103, *Styrax americana;* 407, *S. grandifolia;* 1052, *S. grandifolia* (a more pubescent form); 1338, *S. pulverulenta;* 731 and 1340, *S. platanifolia;* 217, *S. platanifolia* var. *stellata.* Only 111 resists morphological correlation. Although 111 has some aspects of *Styrax americana* and of *S. pulverulenta,* many differences are shown in Table 4.

TABLE 4. — A comparison of three *Styrax* specimens.

103, *Styrax americana*	111, *Styrax* sp.	1338, *Styrax pulverulenta*
leaves slightly pubescent below	leaves very pubescent below	leaves very pubescent below
leaves 2-3 cm wide	leaves 5-6 cm wide	leaves 3-4 cm wide
leaves 8-9 cm long	leaves 11-14 cm long	leaves 7-8 cm long
calyx glabrous	calyx pubescent	calyx densely pubescent
petals narrow	petals wide	petals narrow
petals valvate	petals imbricate	petals imbricate
filaments glabrous	filaments densely pubescent (½)	filaments pubescent lower ½
inflorescence of 3-4 flowers	inflorescence of 1-4 flowers	inflorescence of 2-4 flowers
flowers rotate	flowers salverform	flowers rotate
bark simple smooth	bark stringy	bark slightly stringy
petals ⅜" long	petals ¾" long	petals ⅜" long

The numbers within the doubly-lined rectangle in Table 5 indicate the degree of correlation of the unit (1340, 217, 111, 731) and the unit (1338, 1052, 407, 103). The average number of those 16 interactions is 4.5; the average of the self-interactions of the unit (1340, 217, 111, 731), 2.8; and that of the unit (1338, 1052, 407, 103), 3.5. Other groupings provide larger self-differences and smaller group-group differences. The simplest generalization is that there is a division of the 8 collections that minimizes internal disparity and maximizes the differences between groups; this division is the one indicated by the double lines in Table 5. Even a shift to include 731 in the group with 1338, 1052, 407 and 103 increases slightly the internal disparity of each group and decreases the distinctiveness of the two groups.

TABLE 5. — Number of correlated chemical differences between *Styrax* collections.

	103	407	1052	1338	731	111	217	1340
1340	6	3	6	4	3	3	3	–
217	7	4	5	3	2	4	–	
111	5	4	5	3	2	–		
731	5	4	5	1	–			
1338	4	3	4	–				
1052	4	3	–					
407	3	–						
103	–							

Certainly 111 is distinct from *Styrax americana* (103) and from *S. pulverulenta* (1338). If the fragmentary collection data for 111 is correct (mountainside near Alpine, Texas), then the distinctiveness of this specimen is easy to accept. Two species of *Styrax* are reported from western Texas, *S. texana* Cory and *S. youngae* Cory. Neither has been available for chemical study, although material of both identified by Cory has been available for morphological analysis. *Styrax texana* and *S. youngae* are pubescence and leaf shape variants of the *S. platanifolia* complex. Collection 111 is clearly not an element of the plataniform group and represents an undescribed taxon.

Various collections of *Styrax* spp. from Texas have been labeled *S. grandifolia, S. pulverulenta, S. platanifolia,* and *S. platanifolia* var. *stellata* by competent botanists. In other words, only the widespread *S. americana* appears not to extend to Texas. An examination of labeled, preserved collections of North American *Styrax* at the U.S. National Herbarium and at the Academy of Natural Sciences of Philadelphia has indicated that *S. americana* and *S. grandifolia* are easily distinguished and *S. americana* and *S. pulverulenta* slightly less easily distinguished. Of particular significance is that specimens easily identified as *S. americana, S. pulverulenta* or *S. grandifolia* all tend to produce regular leaves with slight, inconspicuous dentations, but they occasionally produce leaves with extended dentations (sometimes so extended that the leaves seem plataniform!). Moreover, casual observations with rather limited material suggest that such irregularly extended dentations occur more conspicuously (frequently?) toward the midwest and particularly toward Texas!

Considering the distinctiveness of the *S. platanifolia* group in central Texas and its possible role in the evolutionary history of *S. americana* and *S. grandifolia,* it seems worthwhile to consider whether specific chemical correlations may suggest disparities or similarities of these various *Styrax* taxa.

Upon examination of Table 5, with the taxonomic categories in mind, it is clear that there are generally 3 to 4 chemical differences among coordinates of the *S. pulverulenta, S. grandifolia,* and *S. americana* group. Surprisingly, the two pubescence forms of *S. grandifolia* (1052 + 407) have about as many differences as any two correlatives! Also, *S. platanifolia, S. platanifolia* var. *stellata* and *Styrax* sp. (111) form a coherent group: the two collections of *S. platanifolia* are about as distinct as any two correlatives of the unit. Table 4, however, does not give us specific information about chemical relatedness. Table 3 gives us the specific chemical information which can be used to infer phylogenies.

Much work has been done on chemical complementarity in hybrids (Alston and Turner, 1963a + b; Carter and Brehm, 1969; Smith and Levin, 1963; Levin, 1966); also, arguments have been published that speciation is related to hybridization (Anderson and Stebbins, 1954; Grant, 1966; Lewis, 1966; Schechter and Johnson, 1968). When two individuals with different chemical patterns hybridize there is often a composite pattern produced in the hybrid; therefore, the hybrid pattern may be composed of elements of both parents. Using the model of complementarity, it is possible to suggest several cases where two *Styrax* taxa may have been involved in the development of a third taxon.

There is a great chemical similarity between *Styrax platanifolia* (731) and *S. pulverulenta* (1338). The chemical pattern of *S. pulverulenta* (1338) is nearly an exact composite of *S. platanifolia* (731) and *S. americana* (103). Also, a composite of *S. americana* (103) and *Styrax* sp. (111) is a pattern very similar to that of *S. pulverulenta.* In the U.S. National Herbarium there are two collections of *Styrax* from Jasper Co., Texas (*C. L. Lundell 11825 and 11855*), which exhibit many morphological characteristics suggestive of natural hybrids of *S. platanifolia* and *S. pulverulenta.* Therefore, I think it is probable that *S. platanifolia* has been or is directly involved in the biological identity of *S. pulverulenta.*

The chemical pattern of 731 (*S. platanifolia*) is virtually a composite of the patterns of 1340 (*S. platanifolia*) and 217 (*S. platanifolia* var. *stellata*). Hybridization of the two varieties could have occurred at some time in the past to introduce and/or maintain a degree of variability in *S. platanifolia.* Perhaps, also, at some time in the past there was a continuum from *S. platanifolia* to *S. platanifolia var. stellata* so that the relictual status of these specimens now enhances apparent distinctiveness.

The phenolic pattern of collection 111 is apparently a type of pattern involved in the evolution of the *S. platanifolia* var. *stellata* pattern, and consequently, the *S. platanifolia* patterns. The comparisons of the phenolic patterns of the *S. platanifolia* complex, of *S.* sp. (111), *S. americana* and *S. pulverulenta* do not show simple complementarity but various stages of intermediacy.

During this study another undescribed taxon has been noted from Mexico (Coahuila: Musquiz, 1935, *Lynd and Mueller 340;* A, NY). On morphological grounds it may be the previously unnoted extreme of the range from *S. americana* through the *S. platanifolia* complex. Collection 111 is also intermediate between the Coahuila *Styrax* and *S. americana.*

CONCLUSIONS

On the basis of a taxonomic study, without considering variability, it seems that two groups of *Styrax* species exist: One consists of *S. americana, S. grandifolia* (2 forms) and *S. pulverulenta;* and the other of *S. platanifolia, S. platanifolia* var. *stellata* and *Styrax* sp. (111). The very distinct *Styrax* sp. (111) is clearly implicated in the evolution of the *S. platanifolia* elements. Moreover, the *S. platanifolia* taxa are very similar to *S. pulverulenta* and apparently have hybridized with *S. pulverulenta* in Texas.

Collection 111 and the *S. platanifolia* complex (including *S. platanifolia* var. *stellata, S. texana* and *S. youngae*) are all intermediates between *S. americana* (through *S. pulverulenta*) and an undescribed archetype, perhaps Lynd and Mueller's Coahuila *Styrax.*

A simple phylogenetic tree, consistent with chemical data and morphological observations is illustrated in Figure 1.

ACKNOWLEDGMENTS

The author wishes to thank Miss Josephine de N. Henry of the Henry Foundation, Gladwyne, Pennsylvania, for encouragement with this project and for making available the collections of Mrs. Mary G. Henry. Rommel Crabtree, Margaret Buckby and Joyce Johnstone assisted the author. Some of the equipment used in this work was provided through a grant from the American Philosophical Society.

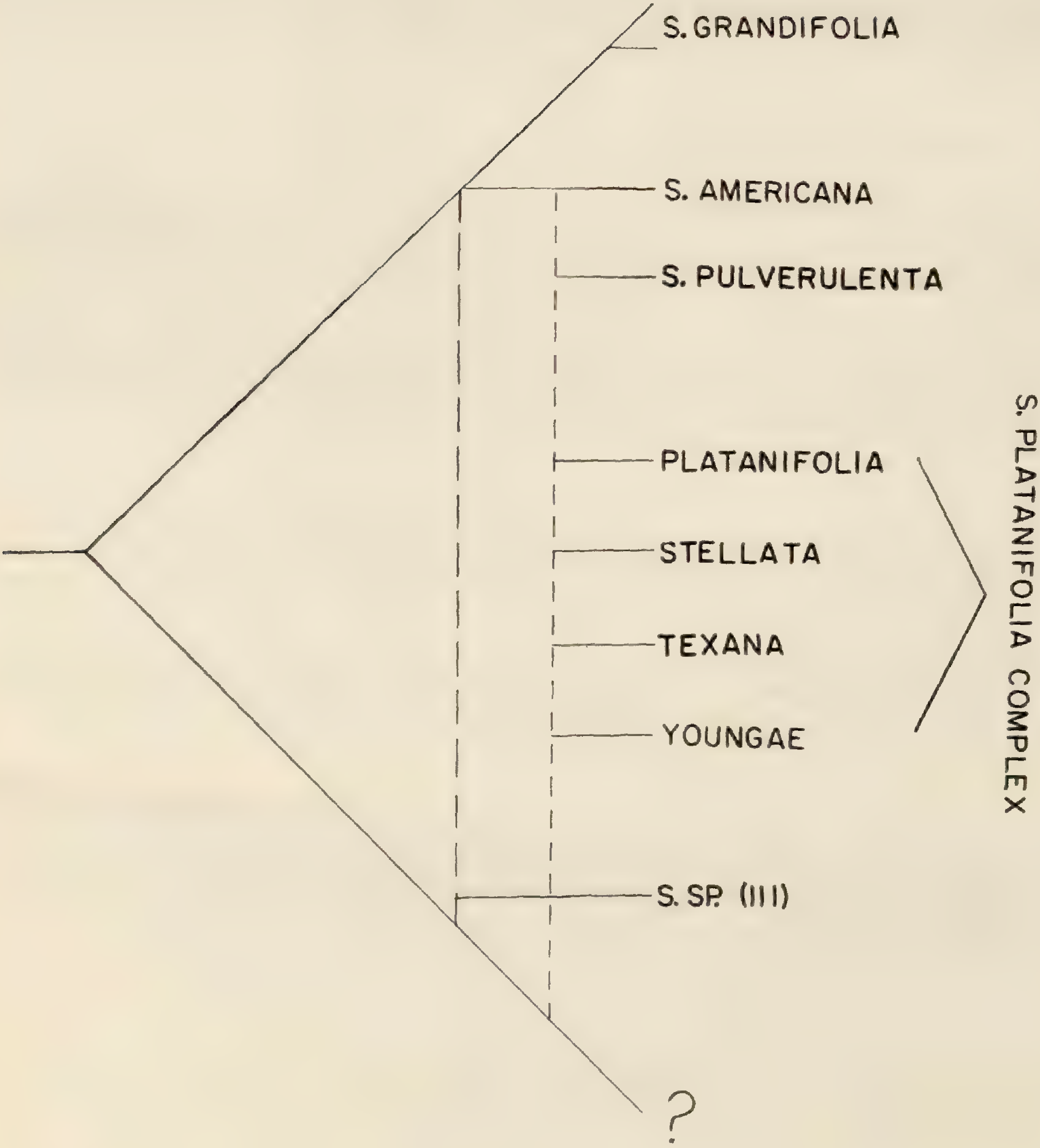

S. GRANDIFOLIA
S. AMERICANA
S. PULVERULENTA
PLATANIFOLIA
STELLATA
TEXANA
YOUNGAE
S. PLATANIFOLIA COMPLEX
S. SP. (III)
?

FIG. 1.—Relationships among the *Styrax* taxa studied.

BIBLIOGRAPHY

ALSTON, R. A. & B. L. TURNER. 1963a. Natural Hybridization among Four Species of *Baptisia*. Am. J. Bot. 50:159.

————. 1963b. Biochemical Systematics. Prentice Hall, New Jersey.

ANDERSON, E. & G. L. STEBBINS. 1954. Hybridization as an Evolutionary Stimulus. Evolution 8:378-88.

CARTER, L. & B. BREHM. 1969. Chemical & Morphological Analysis of Introgressive Hybridization between *Iris tenax* and *I. chrysophylla*. Brittonia 21(1):44-54.

GRANT, V. 1966. The Origin of a New Species of *Gilia* in a Hybridization Experiment. Genetics 54:1189-1199.

LEVIN, D. 1966. Chromatographic Evidence of Hybridization and Evolution in *Phlox maculata*. Am. J. Bot. 53(3):238-245.

LEWIS, H. 1966. Speciation in Flowering Plants. Science 152:167-172.

SCHECHTER, Y. & B. L. JOHNSON. 1968. The Probable Origin of *Oryzopsis contracta*. Am. J. Bot. 55:611-618.

SMITH, D. & D. LEVIN. 1963. A Chromatographic Study of Reticulate Evolution in the Appalachian *Asplenium Complex*. Am. J. Bot. 50(91):952-959.

Arethusa bulbosa forma *albiflora* at Quaker Bridge, New Jersey

WILLIAM S. SIPPLE
Maryland Department of Natural Resources

According to Correll (1950), *Arethusa bulbosa* L. is a true bog plant that occurs in "Newfoundland, Nova Scotia, Anticosti, New Brunswick, Quebec and Ontario . . . through New England, New York, New Jersey and Pennsylvania, south to the mountains and Piedmont Plateau of North Carolina . . . through the Central and Lake States to Wisconsin . . . and Minnesota." Stations further south, in South Carolina and Louisiana, were considered questionable by Correll. In New Jersey, Stone (1911) stated that this species was an open bog plant that was "occasional in the northern counties and Middle district, locally common in the Pine Barrens and Cape May peninsula." Its distribution in New Jersey has undoubtedly decreased considerably since the publication of Stone's book and personal observations suggest that, in southern New Jersey at least, it is of rare occurrence. Fernald (1950) stated that it was rapidly becoming extinct south of Newfoundland and Canada.

Recently, on June 18, 1971, a white flowering form of this orchid was collected at Quaker Bridge on the Batsto River. This plant, *Arethusa bulbosa* f. *albiflora* Rand & Redfield, was originally found in Maine (Correll, 1950). Its complete distribution is not given by Correll (1950) or Fernald (1950) and it is not listed by Gleason (1963). Apparently it might occur in any population. However, a search of four herbaria at the New York Botanical Garden, the Academy of Natural Sciences of Philadelphia, the University of Pennsylvania, and Rutgers revealed no collections of f. *albiflora* from New Jersey. Hence, the present collection apparently represents the first of its kind in New Jersey.

LITERATURE CITED

CORRELL, D. S. 1950. Native Orchids of North America. Chronica Botanica, Waltham. xv + 399 pp.

FERNALD, M. L. 1950. Gray's Manual of Botany. 8th ed. American Book Co., New York. lxiv + 1632 pp.

GLEASON, H. A. 1963. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. Hafner Publishing Co., New York. 3 v.

STONE, W. 1911. The Plants of Southern New Jersey. Ann. Rep. N.J. State Mus. 1910, Part II, pp. 21-828.

A Check-list of the Flora of Montgomery County, Pennsylvania

EDGAR T. WHERRY
University of Pennsylvania

Our far-southeast Pennsylvania county for which no modern check-list has been published is Montgomery. Records for it in the University of Pennsylvania State Flora Catalog have accordingly been assembled, and are here presented along the same lines as other recent county lists. Introduced taxa are surrounded by brackets [ ].

PTERIDOPHYTES

LYCOPODIACEAE: *Lycopodium clavatum, flabelliforme, lucidulum, obscurum* typ. & v. *dendroideum, tristachyum.*

SELAGINELLACEAE: *Selaginella apoda, rupestris.*

ISOETACEAE: *Isoetes engelmannii.*

EQUISETACEAE: *Equisetum arvense, hyemale, sylvaticum.*

OPHIOGLOSSACEAE: *Botrychium dissectum, matricariifolium, obliquum, oneidense, virginianum. Ophioglossum vulgatum* v. *pseudopodum* & v. *pycnostichum.*

OSMUNDACEAE: *Osmunda cinnamomea, claytoniana, regalis* v. *spectabilis.*

POLYPODIACEAE (*s.l.*): *Adiantum pedatum, Asplenium × ebenoides, platyneuron, ruta-muraria, trichomanes. Athyrium angustum* typ., v. *elatius* & v. *rubellum, asplenioides, pycnocarpon, thelypterioides. Camptosorus rhizophyllus. Cheilanthes lanosa. Cystopteris bulbifera, fragilis* v. *mackayi, protrusa, × tennesseensis. Dennstaedtia punctilobula. Dryopteris × boottii, carthusiana* ("*spinulosa*"), *clintoniana, cristata, goldiana, intermedia, marginalis, × triploidea.* [*Matteuccia pensylvanica*]. *Onoclea sensibilis* typ. & f. *obtusilobata. Pellaea atropurpurea, glabella. Phegopteris connectilis, hexagonoptera. Polypodium virginianum. Polystichum acrostichoides. Pteridium aquilinum* v. *latiusculum. Thelypteris noveboracensis, palustris* v. *pubescens. Woodsia obtusa.*

SPERMATOPHYTES

CONIFERS

TAXACEAE: *Taxus canadensis.*

PINACEAE: *Pinus echinata, rigida, strobus, virginiana. Tsuga canadensis.*

CUPRESSACEAE: *Juniperus communis* typ. & v. *depressa, virginiana.*

MONOCOTS, REDUCED

TYPHACEAE: *Typha angustifolia, latifolia* typ. & v. *ambigua.*

SPARGANIACEAE: *Sparganium americanum, eurycarpum.*

NAIADACEAE: *Naias flexilis. Potamogeton amplifolius, berchtoldii,* [*crispus*], *diversifolius, epihydrus* v. *nuttallii, foliosus* v. *macellus, illinoensis, nodosus, pectinatus.*

ALISMATACEAE: *Alisma subcordatum.* *Sagittaria australis, latifolia* typ., v. *pubescens,* & forms.

HYDROCHARITACEAE: [*Egeria densa*]. *Elodea canadensis, nuttallii.* *Vallisneria americana.*

GRASSES

GRAMINEAE: [*Agropyron repens*]. *Agrostis alba, altissima, hyemalis,* [*palustris*], *perennans, scabra.* *Alopecurus aequalis.* *Andropogon elliottii, gerardii,* (*Schizachyrium*) *scoparius, virginicus.* [*Anthoxanthum odoratum*]. *Aristida dichotoma, longespica* v. *geniculata, oligantha.* [*Arrhenatherum elatius*]. [*Avena sativa*]. *Bouteloua curtipendula.* *Brachyelytrum erectum.* *Bromus* [*commutatus*], [*inermis* typ. & v. *divaricatus*], [*japonicus* v. *porrectus*], *pubescens* ("*purgans*"), *purgans* ("*latiglumis*"), [*racemosus*], [*secalinus*], [*sterilis*], [*tectorum*]. *Calamagrostis canadensis, cinnoides,* [*epigejos* v. *georgica*]. *Cenchrus longispinus.* *Cinna arundinacea.* [*Cynodon dactylon*]. [*Cynosurus cristatus*]. [*Dactylis glomerata*]. *Danthonia compressa, spicata.* *Deschampsia flexuosa.* *Digitaria filiformis,* [*ischaemum*], [*sanguinalis*]. *Echinochloa* [*crusgalli*], *pungens.* [*Eleusine indica*]. *Elymus canadensis, riparius, villosus* typ. & v. *arkansanus, virginicus* typ. & f. *hirsutiglumis.* *Eragrostis capillaris,* [*cilianensis*], *frankii, hypnoides,* [*multicaulis*], *pectinacea,* [*pilosa*], [*poaeoides*], *spectabilis.* *Festuca* [*capillata*], *obtusa,* (*Vulpia*) *octoflora* v. *tenella,* [*ovina*], [*pratensis* (*elatior*)], [*rubra*]. *Glyceria acutiflora, canadensis, pallida, septentrionalis, striata.* [*Heleochloa schoenoides*]. [*Holcus lanatus*]. *Hordeum jubatum,* [*vulgare*]. *Hystrix patula* typ. & v. *bigeloviana.* *Leersia oryzoides, virginica.* [*Lolium multiflorum*], [*perenne*], [*temulentum*]. [*Microstegium* (*Eulalia*) *vimineum*]. [*Miscanthus sinensis*]. *Muhlenbergia frondosa, mexicana, schreberi, sobolifera, sylvatica, tenuiflora.* *Oryzopsis racemosa.* *Panicum agrostoides, anceps, boscii* typ. & v. *molle, capillare* typ. & v. *occidentale, clandestinum, commutatum* typ. & v. *ashei, depauperatum* typ. & v. *psilophyllum, dichotomiflorum, dichotomum* typ. & v. *barbulatum, flexile, gattingeri, implicatum, latifolium, lindheimeri, linearifolium* typ. & v. *werneri, longifolium, lucidum, meridionale, microcarpon,* [*miliaceum*], *philadelphicum, polyanthes, recognitum, scribnerianum, sphaerocarpon, stipitatum, villosissimum, virgatum, yadkinense.* *Paspalum laeve* typ., v. *circulare* & v. *pilosum, pubescens, supinum.* *Phalaris arundinacea* typ. & f. *variegata.* [*Phleum pratense*]. *Phragmites australis* (*communis*). *Poa alsodes,* [*annua*], [*compressa*], *cuspidata, nemoralis, palustris,* [*pratensis*], *sylvestris,* [*trivialis*]. [*Puccinellia distans*]. [*Secale cereale*]. *Setaria* [*faberi*], *geniculata,* [*italica*], [*lutescens*], [*verticillata*], [*viridis*]. *Sorghastrum nutans.* [*Sorgum sudanense*], [*vulgare*]. *Sphenopholis intermedia, nitida, obtusata* typ. & v. *pubescens.* *Sporobolus asper, neglectus, vaginiflorus.* *Tridens flavus* typ. & f. *cuprea.* *Trisetum pensylvanicum.* [*Triticum aestivum*]. [*Zea mays*].

SEDGES

Cyperaceae: *Bulbostylis capillaris. Carex abdita, aggregata, albolutescens, amphibola* typ., v. *rigida* & v. *turgida, angustior, annectens* typ. & v. *xanthocarpa, argyrantha, artitecta, bicknellii, blanda, brevior, bromoides, bushii, buxbaumii, caroliniana, cephaloidea, cephalophora, communis, conjuncta, conoidea, convoluta, crinita, cristatella, davisii, debilis, digitalis, emmonsii, emoryi, festucacea, folliculata, frankii, glaucodea, gracilescens, gracillima, granularis, grayi* typ. & v. *hispidula, gynandra, haydenii, hirsutella,* [*hirta*], *hirtifolia, hitchcockiana, hystricina, incomperta, interior, intumescens, jamesii, laevivaginata, lanuginosa, laxiculmis, laxiflora, leavenworthii, leptalea, lupuliformis, lurida, meadii, mesochorea, molesta, muhlenbergii, nigromarginata, normalis, oligocarpa, pallescens* v. *neogaea, pedunculata, pensylvanica* typ. & v. *glumabunda, plana, platyphylla, prasina, projecta, radiata, retroflexa, rosea, scoparia, seorsa, sparganioides,* [*spicata*], *sprengelii, squarrosa, sterilis, stipata, straminea, striatula, stricta, strictior, styloflexa, swanii, tonsa, torta, tribuloides, trichocarpa, typhina, vestita, virescens, vulpinoidea, willdenowii. Cyperus aristatus, compressus, erythrorhizos, esculentus* typ. & v. *angustispicatus, filiculmis* typ. & v. *macilentus, flavescens, odoratus, ovularis, rivularis, schweinitzii, strigosus, tenuifolius. Dulichium arundinaceum. Eleocharis acicularis, calva, engelmannii, obtusa, smallii, tenuis, tuberculosa. Eriophorum gracile, virginicum. Fimbristylis autumnalis. Rhynchospora alba, capitellata. Scirpus americanus, cyperinus* incl. vars., *expansus, georgianus, hattorianus, microcarpus, pendulus, polyphyllus, purshianus, validus, verecundus. Scleria muhlenbergii, pauciflora.*

MONOCOTS, ADVANCED

Araceae: *Acorus calamus. Arisaema dracontium, pusillum* (*triphyllum,* GM), *triphyllum* (*atrorubens,* GM). *Orontium aquaticum. Peltandra virginica,* [*Pinellia ternata*]. *Symplocarpus foetidus.*

Lemnaceae: *Lemna minor, trisulca. Spirodela polyrhiza.*

Xyridaceae: *Xyris torta* (*caroliniana,* GM).

Commelinaceae: *Commelina communis* typ. & v. *ludens. Tradescantia ohioensis, virginiana.*

Pontederiaceae: *Heteranthera dubia, reniformis. Pontederia cordata.*

Juncaceae: *Juncus acuminatus, biflorus, bufonius, canadensis, dudleyi, effusus* v. *pylaei* & v. *solutus, gerardii, marginatus, platyphyllus, scirpoides, secundus, tenuis* typ. & v. *anthelatus. Luzula acuminata, echinata, multiflora.*

Liliaceae: *Aletris farinosa. Allium canadense,* [*cepa*], [*oleraceum*], *tricoccum,* [*vineale*]. *Amianthium muscaetoxicum.* [*Asparagus officinalis*]. *Chamaelirium luteum.* [*Convallaria majalis*]. *Erythronium americanum.* [*Hemerocallis flava*], [*fulva* typ. & cv. Kwanso]. [*Hosta ventricosa*]. *Lilium canadense* typ., v. *editorum* & f. *rubrum, philadelphicum, superbum. Maianthemum canadense* typ. & v. *interius. Medeola virginiana. Melanthium hybridum.* [*Muscari botryoides*]. [*Ornithogalum umbellatum*]. *Polygonatum biflorum, canaliculatum, pubescens.*

[*Scilla nonscripta*]. *Smilacina racemosa* typ. & v. *cylindrata, stellata. Smilax glauca* v. *leurophylla, herbacea, hispida, pulverulenta, rotundifolia. Trillium cernuum* typ. & v. *macranthum*, [*erectum*], [*grandiflorum*]. [*Tulipa sylvestris*]. *Uvularia perfoliata, sessilifolia. Veratrum viride.*

AMARYLLIDACEAE: *Hypoxis hirsuta.* [*Narcissus poeticus*], [*pseudo-narcissus* cv. Plenus].

DIOSCOREACEAE: *Dioscorea* [*batatas*], *villosa.*

IRIDACEAE: [*Belamcanda chinensis*]. *Iris* [*germanica*], *prismatica*, [*pseudacorus*], *versicolor. Sisyrinchium angustifolium*, × *intermedium, mucronatum.*

ORCHIDACEAE: *Aplectrum hyemale. Calopogon pulchellus. Corallorhiza maculata, odontorhiza, wisteriana. Cypripedium acaule, calceolus* v. *pubescens. Goodyera pubescens. Habenaria clavellata, cristata, fimbriata, flava* v. *herbiola, lacera. Isotria medeoloides, verticillata. Liparis lilifolia, loeselii. Malaxis unifolia. Orchis spectabilis. Pogonia ophioglossoides. Spiranthes cernua, gracilis, lucida, tuberosa. Triphora trianthophora.*

DICOTS, FREE-PETAL

SAURURACEAE: *Saururus cernuus.*

SALICACEAE: *Populus* [*alba*], [*balsamifera*], [*canescens*], *deltoides, grandidentata*, [*nigra* v. *italica*], *tremuloides. Salix* [*alba*], [*babylonica*], *bebbiana*, [*caprea*], [*cinerea*], *discolor* typ. & v. *prinoides*, [*fragilis*], *humilis* typ. & v. *rigidiuscula, lucida*, × *myricoides, nigra* typ. & v. *falcata*, [*pentandra*], *rigida*, [× *rubens*], *sericea, tristis.*

MYRICACEAE: *Comptonia peregrina. Myrica heterophylla, pensylvanica.*

JUGLANDACEAE: *Carya cordiformis, glabra, ovalis, ovata, tomentosa. Juglans cinerea, nigra.*

BETULACEAE: *Alnus* [*glutinosa*], *serrulata. Betula* [*alba*], *lenta, nigra, populifolia.*

CORYLACEAE: *Carpinus caroliniana* v. *virginiana. Corylus americana, cornuta. Ostrya virginiana.*

FAGACEAE: *Castanea dentata. Fagus grandifolia. Quercus alba, bicolor, coccinea*, × *exacta, falcata*, × *heterophylla, ilicifolia*, [*imbricaria*], *marilandica, muhlenbergii, palustris, prinoides, prinus*, [*robur*], *rubra*, × *saulii, stellata, velutina.*

ULMACEAE: *Celtis canina, georgiana, occidentalis, tenuifolia. Ulmus americana, rubra.*

MORACEAE: [*Broussonetia papyrifera*]. [*Maclura pomifera*]. *Morus* [*alba*], *rubra.*

CANNABACEAE: [*Cannabis sativa*]. [*Humulus japonicus*], [*lupulus*].

URTICACEAE: *Boehmeria cylindrica* typ. & v. *drummondiana. Laportea canadensis. Parietaria pensylvanica. Pilea pumila.* [*Urtica dioica*], [*urens*].

SANTALACEAE: *Comandra umbellata.*

ARISTOLOCHIACEAE: *Aristolochia serpentaria. Asarum canadense* typ. & v. *reflexum.*

Polygonaceae: [*Fagopyrum sagittatum*]. *Polygonella articulata*. *Polygonum arifolium* v. *pubescens*, [*aubertii*], [*aviculare* typ. & v. *vegetum*], [*caespitosum* (*longisetum*)], [*convolvulus*], *cristatum*, [*cuspidatum*], *erectum*, [*hydropiper*], *hydropiperoides*, *lapathifolium*, [*orientale*], *pensylvanicum* typ. & v. *laevigatum*, [*persicaria*], *punctatum* typ. & v. *confertiflorum*, *sagittatum*, *scandens*, *tenue*. *Rumex* [*acetosa*], [*acetosella*], [*altissimus*], [*crispus*], [*obtusifolius*]. *Tovara virginiana*.

Chenopodiaceae: *Atriplex patula* typ. & v. *hastata*, [*Beta vulgaris*], *Chenopodium* [*album* typ. & v. *lanceolatum*], [*ambrosioides* typ. & v. *chilense*], [*botrys*], [*carinatum*], *gigantospermum*, [*glaucum*], *missouriense*, [*murale*], *standleyanum*. [*Kochia scoparia* typ. & cv. Culta]. [*Salsola Kali* v. *tenuifolia*].

Amaranthaceae: *Amaranthus albus*, [*graecizans*], [*hybridus*], [*lividus*], [*powellii*], [*retroflexus*], [*spinosus*]. [*Celosia argentea*]. [*Froelichia gracilis*].

Nyctaginaceae: [*Mirabilis jalapa*]. [*Oxybaphus nyctagineus*].

Phytolaccaceae: *Phytolacca americana*.

Aizoaceae: [*Sesuvium maritimum*].

Molluginaceae: [*Mollugo verticillata*].

Tetragoniaceae: [*Tetragonia tetragonioides*].

Portulacaceae: *Claytonia virginica* typ. & f. *robusta*. [*Portulaca grandiflora*], [*oleracea*].

Caryophyllaceae: [*Agrostemma githago*]. *Arenaria* [*serpyllifolia*], *stricta*. *Cerastium arvense*, [*glomeratum* (*viscosum*)], [*holosteoides* (*vulgatum*)], *nutans*. [*Dianthus armeria*]. [*Lychnis coronaria*], [*flos-cuculi*]. *Moehringia lateriflora*. [*Myosoton aquaticum*]. *Paronychia canadensis*, *fastigiata*. [*Petrorhagia saxifraga*]. *Sagina decumbens*, [*japonica*], *procumbens*. [*Saponaria officinalis*]. [*Scleranthus annuus*]. *Silene* [*alba*], *antirrhina* typ. & f. *deaneana*, [*armeria*], [*cserei*], *caroliniana* v. *pensylvanica*, [*noctiflora*], *stellata*, [*vulgaris*]. *Stellaria alsine*, [*graminea*], *longifolia*, [*media*], *pubera*. [*Vaccaria pyramidata*].

Nymphaeaceae: *Nuphar advena*.

Ceratophyllaceae: *Ceratophyllum demersum*.

Ranunculaceae: *Actaea pachypoda*. *Anemone quinquefolia*, *virginiana*. *Anemonella thalictroides*. *Aquilegia canadensis*, [*vulgaris*]. *Caltha palustris*. *Cimicifuga racemosa*. *Clematis* [*dioscoreifolia*], *verticillaris*, *virginiana*. [*Delphinium ajacis*]. [*Helleborus viridis*]. *Hepatica americana*. *Hydrastis canadensis*. [*Paconia lactiflora*]. *Ranunculus abortivus* typ. & f. *coptidifolius*, [*acris*], *ambigens*, [*bulbosus*], *fascicularis*, *hispidus* typ. & v. *falsus*, *longirostris*, *micranthus* v. *delitescens*, *recurvatus*, [*repens* typ. & v. *pleniflorus*], [*sceleratus*], *septentrionalis*, *trichophyllus*. *Thalictrum dioicum*, *polygamum*, *revolutum*.

[Lardizabalaceae: *Akebia quinata*].

Berberidaceae: [*Berberis thunbergii*], [*vulgaris*]. *Caulophyllum thalictroides*. *Jeffersonia diphylla*. *Podophyllum peltatum*.

Menispermaceae: *Menispermum canadense*.

MAGNOLIACEAE: *Liriodendron tulipifera. Magnolia* [*tripetala*], *virginiana.*

ANONACEAE: *Asimina triloba.*

LAURACEAE: *Lindera benzoin. Sassafras albidum* typ. & v. *molle.*

PAPAVERACEAE: [*Eschscholtzia californica*]. [*Chelidonium majus*]. [*Macleaya cordata*]. [*Papaver rhoeas*], [*somniferum*]. *Sanguinaria canadensis.*

FUMARIACEAE: *Adlumia fungosa. Corydalis flavula, sempervirens. Dicentra canadensis, cucullaria.*

CRUCIFERAE: [*Alliaria petiolata*]. [*Arabidopsis thaliana*]. *Arabis canadensis, glabra, hirsuta* v. *adpressipilis, laevigata, lyrata,* [*missouriensis*], *patens.* [*Armoracia rusticana*]. [*Barbarea verna*], [*vulgaris* typ. & v. *arcuata*]. [*Berteroa incana*]. [*Brassica campestris*], [*juncea*], [*kaber* v. *pinnatifida*], [*nigra*], [*oleracea*]. [*Camelina microcarpa*]. [*Capsella bursa-pastoris*]. *Cardamine bulbosa,* [*hirsuta*], [*impatiens*], *parviflora* v. *arenicola, pensylvanica.* [*Conringia orientalis*]. [*Coronopus didymus*]. *Dentaria heterophylla, laciniata.* [*Draba verna*]. [*Erysimum cheiranthoides*], [*repandum*]. [*Hesperis matronalis*]. [*Iberis umbellata*]. *Lepidium* [*campestre*], [*densiflorum*], *virginicum.* [*Lobularia maritima*]. [*Lunaria annua*]. [*Nasturtium microphyllum*], [× *sterilis*], [*officinale*]. [*Raphanus raphanistrum*], [*sativus*]. *Rorippa* [*austriaca*], [*islandica* typ.], *islandica* v. *fernaldiana* & v. *hispida,* [*prostrata*], [*sylvestris*]. [*Sisymbrium altissimum*], [*officinale* v. *leiocarpum*]. [*Thlaspi arvense*].

CAPPARACEAE: [*Cleome houtteana*].

SARRACENIACEAE: *Sarracenia purpurea* v. *gibbosa.*

DROSERACEAE: *Drosera rotundifolia.*

CRASSULACEAE: *Penthorum sedoides.* [*Sedum acre*], [*alboroseum*], [*ellacombianum*], [*sarmentosum*], [*spurium*], [*telephium* v. *purpureum*].

SAXIFRAGACEAE: *Chrysosplenium americanum.* [*Deutzia scabra*]. *Hydrangea arborescens. Mitella diphylla. Parnassia glauca.* [*Philadelphus coronarius*], [*grandiflorus*]. *Ribes americanum,* [*odoratum*], [*rubrum*]. *Saxifraga pensylvanica, virginiensis.*

HAMAMELIDACEAE: *Hamamelis virginiana.*

PLATANACEAE: *Platanus occidentalis.*

ROSACEAE: *Agrimonia gryposepala, microcarpa, parviflora, pubescens, rostellata, striata. Amelanchier arborea, canadensis, laevis, obovalis, sanguinea, stolonifera.* [*Chaenomeles japonica*]. *Crataegus crus-galli, fontanesiana, macrosperma,* [*phaenopyrum*], *punctata* typ. & v. *microphylla, uniflora.* [*Duchesnea indica*]. *Fragaria* [*ananasassa*], [*vesca* typ.] & v. *americana, virginiana. Geum canadense, laciniatum* typ. & v. *trichocarpum,* [*urbanum*], *vernum, virginianum. Gillenia trifoliata.* [*Photinia villosa*]. *Physocarpus opulifolius. Potentilla canadensis, norvegica,* [*recta*], *simplex. Prunus americana,* [*avium*], [*cerasus*], [*maritima*], [*padus*], *pensylvanica,* [*persica*], *serotina, susquehanae, virginiana. Pyrus* (incl. *Aronia* & *Malus*) *arbutifolia* typ. & v. *atropurpurea,* [*baccata*], [*communis*], *coronaria,* [*malus*], *melanocarpa,* [*sieboldii*]. [*Rhodotypos tetrapetalus* (*scandens*)]. *Rosa* [*canina*], *carolina,* [*cinnamomea*], [*gallica*], [*multiflora*], *palustris,* [*rubigi-*

nosa], [*setigera*], *virginiana*, [*wichuraiana*]. *Rubus alleghenienslis, baileyanus, enslenii, flabellaris, frondosus, hispidus*, [*laciniatus*], *occidentalis, odoratus, pensilvanicus*, [*phoenicolasius*], *pubescens*, [*roribaccus*], [*strigosus*]. *Sanguisorba canadensis. Spiraea alba*, [*billardii*], *latifolia. Waldsteinia fragarioides.*

LEGUMINOSAE: [*Amorpha fruticosa*]. *Amphicarpa bracteata, comosa. Apios americana. Baptisia* [*australis*], *tinctoria. Cassia fasciculata, hebecarpa, nictitans. Cercis canadensis.* [*Coronilla varia*]. *Crotalaria sagittalis.* [*Cytisus scoparius*]. *Desmodium canadense, canescens, ciliare, cuspidatum, dillenii* (*perplexum*), *glutinosum, laevigatum, marilandicum, nudiflorum, paniculatum, rigidum, rotundifolium.* [*Gleditsia triacanthos*]. [*Glycine max*]. [*Gymnocladus dioica*]. [*Lathyrus latifolius*]. *Lespedeza capitata* typ. & v. *vulgaris, hirta, intermedia, nuttallii, procumbens, repens*, [*stipulacea*], [*striata*], *violacea, virginica.* [*Lotus corniculatus*]. *Lupinus perennis.* [*Medicago lupulina*], [*sativa*]. [*Melilotus alba*], [*officinalis*]. *Phaseolus polystachios*, [*vulgaris*]. [*Pisum sativum*]. [*Pueraria lobata*]. [*Robinia hispida*], [*pseudo-acacia*]. *Strophostyles helvola. Stylosanthes biflora. Tephrosia virginiana.* [*Trifolium arvense*], [*aureum*], [*campestre*], [*dubium*], [*hybridum*], [*incarnatum*], [*pratense* typ. & v. *leucochraceum*], [*reflexum*], [*repens*]. *Vicia americana*, [*angustifolia* typ. & v. *segetalis*], [*cracca*], [*dasycarpa*], [*hirsuta*], [*tetrasperma*], [*villosa*].

GERANIACEAE: *Geranium carolinianum, maculatum* typ. & f. *albiflorum*, [*molle*], *robertianum*, [*sibiricum*].

OXALIDACEAE: *Oxalis* [*corniculata*], *europaea, filipes, stricta, violacea.*

LINACEAE: *Linum intercursum, medium* v. *texanum, striatum*, [*usitatissimum*], *virginianum.*

ZYGOPHYLLACEAE: [*Tribulus terrestris*].

RUTACEAE: [*Phellodendron japonicum*]. [*Poncirus trifoliata*]. *Ptelea trifoliata. Zanthoxylum americanum.*

SIMAROUBACEAE: [*Ailanthus altissima*].

POLYGALACEAE: *Polygala cruciata* v. *aquilonia, paucifolia, sanguinea, verticillata* typ. & v. *ambigua* & v. *isocycla.*

EUPHORBIACEAE: *Acalypha gracilens, rhomboidea, virginica.* [*Croton capitatus*], [*glandulosus* v. *septentrionalis*]. *Euphorbia* [*chamaesyce*], *corollata*, [*cyparissias*], [*esula*], [*lathyris*], [*marginata*], *nutans* (*maculata*), *supina, vermiculata.*

CALLITRICHACEAE: *Callitriche heterophylla, palustris*, [*stagnalis*], *terrestris* v. *austinii.*

LIMNANTHACEAE: *Floerkea proserpinacoides.*

ANACARDIACEAE: *Rhus copallina* v. *latifolia, glabra, radicans, typhina, vernix.*

AQUIFOLIACEAE: *Ilex opaca, verticillata.*

CELASTRACEAE: *Celastrus* [*orbiculatus*], *scandens. Euonymus* [*alatus* typ. & v. *apterus*], *americanus, atropurpureus*, [*europaeus*].

STAPHYLEACEAE: *Staphylea trifolia.*

ACERACEAE: *Acer* [*campestre*], [*ginnala*], *negundo*, [*palmatum*], [*platanoides*], *rubrum* typ. & v. *trilobum, saccharinum, saccharum* typ. & v. *rugelii, spicatum.*

HIPPOCASTANACEAE: [*Aesculus hippocastanum*], [*parviflora*].

SAPINDACEAE: [*Koelreuteria paniculata*].

BALSAMINACEAE: *Impatiens* [*balsamina*], *capensis, pallida.*

RHAMNACEAE: *Ceanothus americanus.* [*Rhamnus cathartica*], [*davurica*].

VITACEAE: [*Ampelopsis brevipedunculata*]. *Vitis aestivalis* typ. & v. *argentifolia, labrusca,* [*labruscana*], *riparia, vulpina.*

TILIACEAE: *Tilia americana* typ. & v. *neglecta.*

MALVACEAE: [*Abutilon theophrasti*]. [*Althaea rosea*]. *Hibiscus militaris,* [*syriacus*], [*trionum*]. [*Malva moschata*], [*neglecta*]. [*Sida spinosa*].

GUTTIFERAE: *Ascyrum hypericoides. Hypericum canadense, dissimulatum, gentianoides, mutilum,* [*perforatum*], *punctatum, spathulatum, virginicum.*

CISTACEAE: *Helianthemum canadense, propinquum. Lechea leggettii, minor, racemulosa, villosa.*

VIOLACEAE: *Hybanthus concolor. Viola affinis* typ. & albino f., *blanda, conspersa, cucullata,* × *emarginata, fimbriatula, hirsutula, pallens, pedata* typ. & one-color v., *pensylvanica,* × *porteriana,* [cv. *priceana*], *primulifolia, pubescens, rostrata, rotundifolia, sagittata, septentrionalis, sororia* (incl. "*papilionacea*"), *stoneana, striata,* [*tricolor*], *triloba.*

CACTACEAE: *Opuntia compressa.*

ELAEAGNACEAE: [*Elaeagnus umbellata*].

LYTHRACEAE: *Cuphea petiolata. Lythrum alatum, hyssopifolia,* [*salicaria*].

NYSSACEAE: *Nyssa sylvatica.*

MELASTOMACEAE: *Rhexia virginica.*

ONAGRACEAE: *Circaea lutetiana* v. *canadensis. Epilobium angustifolium, coloratum, glandulosum* v. *adenocaulon, leptophyllum, strictum. Gaura biennis. Jussiaea repens* v. *glabrescens. Ludwigia alternifolia, palustris* v. *neogaea. Oenothera biennis, fruticosa* typ. & v. *linearis, laciniata, perennis, pilosella, tetragona* typ. & v. *longistipata.*

HALORAGACEAE: [*Myriophyllum spicatum*]. *Prosperpinaca palustris.*

ARALIACEAE: [*Acanthopanax sieboldianum*]. *Aralia hispida, nudicaulis, racemosa,* [*spinosa*]. [*Hedera helix*]. *Panax quinquefolium, trifolium.*

UMBELLIFERAE: [*Aegopodium podagraria*]. [*Aethusa cynapium*]. [*Anethum graveolens*]. *Angelica venenosa.* [*Apium graveolens*]. [*Bupleurum rotundifolium*]. [*Carum carvi*]. [*Celeri graveolens*]. *Chaerophyllum procumbens. Cicuta bulbifera, maculata.* [*Conium maculatum*]. *Cryptotaenia canadensis.* [*Daucus carota* typ. & f. *roseus*]. *Heracleum maximum. Hydrocotyle americana,* [*sibthorpioides*]. *Osmorhiza claytonii, longistylis* typ. & v. *villicaulis. Oxypolis rigidior.* [*Pastinaca sativa*]. [*Pimpinella saxifraga*]. *Sanicula canadensis, gregaria, marilandica, trifoliata. Sium suave. Taenidia integerrima. Thaspium barbinode, trifoliatum. Zizia aptera, aurea.*

CORNACEAE: *Cornus alternifolia, amomum, florida* typ. & f. *rubra, racemosa, rugosa, stolonifera.*

DICOTS, UNITED-PETAL

ERICACEAE: *Chimaphila maculata, umbellata* v. *cisatlantica. Epigaea repens. Gaultheria procumbens. Gaylussacia baccata, dumosa, frondosa. Kalmia angustifolia, latifolia. Leucothoe racemosa. Lyonia ligustrina, mariana. Monotropa hypopithys, uniflora. Pyrola elliptica, rotundifolia* v. *americana, secunda, virens* v. *convoluta. Rhododendron maximum, periclymenoides* typ., v. *eglandulosum* (*nudiflorum*) & hairy-leaf f., *viscosum. Vaccinium atrococcum, brittonii, caesariense, corymbosum* typ. & v. *glabrum, lamarckii, macrocarpon, stamineum* typ., v. *interius* & v. *neglectum, vacillans.*

PRIMULACEAE: [*Anagallis arvensis*]. *Lysimachia ciliata, hybrida,* [*nummularia*], × *producta, quadrifolia, terrestris,* [*vulgaris*]. *Samolus parviflorus. Trientalis borealis.*

EBENACEAE: *Diospyros virginiana.*

STYRACACEAE: [*Halesia carolina*].

OLEACEAE: [*Forsythia suspensa*]. *Fraxinus americana* typ. & v. *juglandifolia,* [*excelsior*], *nigra, pennsylvanica* typ. & v. *subintegerrima.* [*Ligustrum obtusifolium*], [*ovalfolium*], [*vulgare*]. [*Syringa vulgaris*].

LOGANIACEAE: [*Buddleia davidii*].

GENTIANACEAE: *Bartonia paniculata, virginica.* [*Centaurium pulchellum*]. *Gentiana andrewsii, clausa, crinita, saponaria, villosa. Obolaria virginica. Sabatia angularis* typ. & f. *albiflora.*

APOCYNACEAE: *Apocynum androsaemifolium, cannabinum* typ., v. *glabrum* & v. *pubescens,* × *medium. sibiricum.* [*Vinca major*], [*minor*].

ASCLEPIADACEAE: *Asclepias exaltata, incarnata* typ. & v. *pulchra, purpurascens, quadrifolia, rubra, syriaca, tuberosa, variegata, verticillata,* (*Acerates*) *viridiflora* typ. & v. *lanceolata.* [*Cynanchum nigrum*]. *Matelea* (*Gonolobus*) *obliqua.*

CONVOLVULACEAE: *Calystegia* [*pubescens*], *sepium, spithamaea.* [*Convolvulus arvensis*]. *Cuscuta campestris, compacta,* [*epithymum*], *gronovii, pentagona. Ipomoea* [*batatas*], [*coccinea*], [*hederacea*], *pandurata,* [*purpurea*], [*quamoclit*].

POLEMONIACEAE: [*Collomia linearis*]. *Phlox* [*divaricata laphamii*], *maculata,* [*paniculata*], *pilosa, subulata. Polemonium reptans.*

HYDROPHYLLACEAE: *Ellisia nyctelea. Hydrophyllum virginianum.* [*Phacelia hirsuta*], [*purshii*].

BORAGINACEAE: *Cynoglossum* [*officinale*], *virginianum.* [*Echium vulgare*]. *Hackelia virginiana.* [*Lappula echinata*]. [*Lithospermum arvense*]. *Mertensia virginica* typ. & f. *alba. Myosotis laxa,* [*scorpioides*], *stricta,* [*sylvatica*], *verna,* [*versicolor*]. [*Symphytum officinale*].

VERBENACEAE: *Lippia lanceolata* v. *recognita. Verbena* × *engelmannii, hastata, simplex,* [*stricta*], *urticaefolia* typ. & v. *leiocarpa.*

LABIATAE: *Agastache nepetoides, scrophulariaefolia* v. *mollis.* [*Ajuga reptans*]. *Collinsonia canadensis. Cunila origanoides.* [*Dracocephalum parviflorum*]. [*Glechoma hederacea*]. *Hedeoma pulegioides. Isanthus brachiatus.*

[*Lamium amplexicaule*], [*purpureum*]. [*Leonurus cardiaca*], [*marrubiastrum*]. *Lycopus americanus*, [*europaeus*], × *sherardii, uniflorus, virginicus*. [*Melissa officinalis*]. *Mentha* [*alopecuroides*], *arvensis* typ. & v. *villosa*, [*cardiaca*], [*gentilis*], [*longifolia*], [*piperita*], [*rotundifolia*], [*sativa*], [*spicata*]. *Monarda clinopodia* typ. & [v. *media*], [*didyma*], *fistulosa* v. *mollis*. [*Nepeta cataria*]. [*Ocimum basilicum*]. [*Origanum vulgare*]. [*Perilla frutescens*]. *Physostegia virginiana*. *Prunella* [*laciniata*], *vulgaris* [typ.] & v. *lanceolata*. *Pycnanthemum clinopodioides, incanum, muticum, tenuifolium, verticillatum, virginianum*. *Salvia lyrata*, [*pratensis*], [*sylvestris*], [*verticillata*]. *Satureja vulgaris* v. *neogaea*. *Scutellaria elliptica, integrifolia, lateriflora, nervosa, parvula* v. *leonardii*. *Stachys tenuifolia* typ. & v. *platyphylla*. *Teucrium canadense* v. *virginicum*. [*Thymus serpyllum*]. *Trichostema dichotomum*.

SOLANACEAE: [*Capsicum annuum*]. [*Datura meteloides*], [*stramonium*]. [*Lycium chinense*], [*halimifolium*]. [*Lycopersicum esculentum*]. [*Nicotiana tabacum*]. [*Petunia hybrida*], [*integrifolia*]. *Physalis* [*alkekengii*], *heterophylla* typ. & v. *ambigua, pruinosa, subglabrata*. *Solanum americanum, carolinense*, [*dulcamara* typ. & f. *albiflorum*], [*prostratum*], [*tuberosum*].

SCROPHULARIACEAE: *Agalinis paupercula, purpurea, tenuifolia*. [*Antirrhinum majus*]. *Aureolaria flava, pedicularia, virginica*. *Castilleia coccinea*. [*Chaenorrhinum minus*]. *Chelone glabra* typ. & f. *tomentosa*. [*Cymbalaria muralis*]. ("*Gerardia*" of GM. is here split into 3 genera). *Gratiola neglecta*. [*Kickxia elatine*]. *Linaria canadensis*, [*vulgaris*]. *Lindernia dubia* typ. & v. *riparia*. [*Mazus japonicus*], [*reptans*]. *Melampyrum lineare*. *Mimulus alatus*, [*moschatus*], *ringens*. *Pedicularis canadensis, lanceolata*. *Penstemon* [*calycosus*], *digitalis, hirsutus*, [*pallidus*]. *Scrophularia lanceolata, marilandica*. *Tomanthera auriculata*. [*Verbascum blattaria*], [*phlomoides*], [*thapsus*]. *Veronica americana*, [*anagallis-aquatica* typ. & v. *anagalliformis*], [*arvensis*], [*chamaedrys*], *comosa*, [*filiformis*], [*hederaefolia*], [*longifolia*], *officinalis, peregrina*, [*persica*], [*polita*], *scutellata*, [*serpyllifolia*]. *Veronicastrum virginicum*.

BIGNONIACEAE: *Campsis radicans*. [*Catalpa bignonioides*]. [*Paulownia tomentosa*]. (In GM. placed in preceding family).

PEDALIACEAE: [*Sesamum indicum*].

OROBANCHACEAE: *Conopholis americana*. *Epifagus virginiana*. *Orobanche uniflora*.

ACANTHACEAE: *Justicia americana*.

PHRYMACEAE: *Phryma leptostachya*.

PLANTAGINACEAE: *Plantago* [*aristata*], [*indica*], [*lanceolata*], [*major*], *rugelii, virginica*.

RUBIACEAE: *Cephalanthus occidentalis*. *Diodia teres*. *Galium aparine, asprellum, boreale, circaezans* typ. & v. *hypomalacum*, [*erectum*], *lanceolatum*, [*mollugo*], *obtusum, pilosum, tinctorium, triflorum*, [*verum*]. *Hedyotis* (*Houstonia*) *caerulea*. *Mitchella repens*. [*Sherardia arvensis*].

CAPRIFOLIACEAE: *Diervilla lonicera.* *Lonicera dioica,* [*japonica*], [*maackii*], [*morrowi*], *sempervirens,* [*standishii*], [*tatarica*]. *Sambucus canadensis.* *Symphoricarpos* [*albus* v. *laevigatus*], *orbiculatus.* *Triosteum angustifolium, aurantiacum, perfoliatum.* *Viburnum acerifolium, cassinoides, dentatum, lentago, nudum,* [*opulus*], *prunifolium, rafinesquianum, recognitum,* [*tomentosum*], *trilobum.*

VALERIANACEAE: *Valerianella intermedia,* [*olitoria*], *patellaria.*

DIPSACACEAE: [*Dipsacus fullonum*], [*sylvestris*].

CUCURBITACEAE: [*Citrullus vulgaris*]. [*Cucumis melo*]. [*Cucurbita pepo*]. *Echinocystis lobata.* *Sicyos angulatus.*

CAMPANULACEAE: *Campanula americana, aparinoides,* [*rapunculoides*]. [*Jasione montana*]. *Triodanis* ("*Specularia*") *perfoliata.*

LOBELIACEAE: *Lobelia cardinalis, inflata, siphilitica, spicata* typ. & v. *campanulata.*

COMPOSITAE: CHICORY SUBFAMILY

[*Chondrilla juncea*]. [*Cichorium intybus* typ. & f. *album*]. [*Crepis capillaris*], [*tectorum*]. *Hieracium* [*aurantiacum*], [*flagellare*], [*florentinum*], *gronovii,* [*murorum*], *paniculatum,* [*pilosella*], [*pratense*], [*sabaudum*], *scabrum, venosum,* [*vulgatum*]. [*Hypochaeris radicata*]. [*Ixeris stolonifera*]. *Krigia biflora, virginica.* *Lactuca biennis, canadensis* typ., v. *latifolia, longifolia* & *obovata, floridana* typ. & v. *villosa,* [*scariola* typ. & f. *integrifolia*]. [*Lapsana communis*]. *Prenanthes alba, altissima, serpentaria, trifoliolata.* [*Sonchus asper*], [*oleraceus*], [*uliginosus*]. [*Taraxacum laevigatum*], [*palustre*]. [*Tragopogon majus*], [*porrifolius*], [*pratensis*].

COMPOSITAE: ASTER SUBFAMILY

[*Achillea millefolium* typ. & f. *rosea*]. *Ambrosia artemisiifolia, trifida* typ. & f. *integrifolia.* *Anaphalis margaritacea.* *Antennaria fallax, neglecta, neodioica, parlinii, plantaginifolia* typ. & v. *petiolata.* [*Anthemis arvensis*], [*cotula*], [*tinctoria*]. [*Arctium minus*], [*nemorosum*], [*tomentosum*]. [*Artemisia annua*], [*vulgaris*]. *Aster acuminatus, cordifolius, divaricatus, dumosus, infirmus, laevis, lateriflorus, linariifolius, lowrieanus, macrophyllus, novae-angliae* typ. & f. *roseus, novi-belgii, patens* typ. & v. *phlogifolius, pilosus* typ. & v. *demotus, prenanthoides, puniceus, sagittaefolius, schreberi, simplex, umbellatus, undulatus, vimineus.* [*Bellis perennis*]. *Bidens bipinnata, cernua, comosa, connata* v. *petiolata, coronata, frondosa, laevis, polylepis, vulgata.* [*Calendula officinalis*]. [*Callistephus chinensis*]. [*Carduus acanthoides*]. [*Centaurea cyanus*], [*jacea*], [*maculosa*], [*nigra* typ. & v. *radiata*], [*vochinensis*]. [*Chrysanthemum leucanthemum*], [*morifolium*], [*parthenium*]. *Cirsium altissimum,* [*arvense* typ., v. *integrifolium* & v. *vestitum*], *discolor, muticum, odoratum,* [*vulgare*]. *Coreopsis* [*lanceolata*], [*tinctoria*], *tripteris.* [*Cosmos bipinnatus*], [*sulphureus*]. [*Echinacea purpurea*]. *Eclipta alba.* *Erechtites hieracifolia.* *Erigeron annuus, canadensis, philadelphicus, pulchellus, strigosus* typ. & f. *discoideus.* *Eupatorium album, aromaticum, coelestinum, dubium, fistulosum, hyssopifolium, perfoliatum* typ. & f. *purpureum,* *pilosum, purpureum, rotundifolium, rugosum, sessilifolium.* [*Filago germanica*]. [*Galinsoga ciliata*], [*parviflora*]. *Gnaphalium obtusifolium, uliginosum. Helenium* [*amarum*], *autumnale,* [*flexuosum*]. *Helianthus annuus, decapetalus, divaricatus, giganteus,* [*grosseserratus*], [*laetiflorus* typ. & v. *rigidus*], [*mollis*], *strumosus, tuberosus. Heliopsis helianthoides.* [*Inula helenium*]. *Kuhnia* (*Brickellia*) *eupatorioides. Liatris spicata.* [*Matricaria chamomilla*], [*suaveolens*]. *Mikania scandens.* [*Parthenium integrifolium*]. *Pluchea camphorata. Polymnia uvedalia. Rudbeckia fulgida, hirta* v. *pulcherrima, laciniata* typ. [& cv. Hortensia], *triloba. Senecio aureus* v. *gracilis* & *intercursus, obovatus, pauperculus* typ. & v. *crawfordii, smallii,* [*vulgaris*]. *Sericocarpus asteroides, linifolius.* [*Silphium perfoliatum*]. *Solidago altissima, arguta, bicolor, caesia, canadensis* typ. & v. *hargeri, flexicaulis, gigantea* typ. & v. *leiophylla, graminifolia* v. *nuttallii, juncea, nemoralis, patula, puberula, rigida, rugosa* typ., v. *aspera, sphagnophila* & *villosa, speciosa, squarrosa, tenuifolia, ulmifolia.* [*Tagetes erecta*], [*patula*]. [*Tanacetum vulgare*]. [*Tussilago farfara*]. *Vernonia noveboracensis. Xanthium chinense, italicum, pensylvanicum.*

The above list comprises 1792 taxa, of which 1221 are presumed to be indigenous and 571 introduced, somewhat more than in nearby Delaware County but considerably less than Philadelphia County.

Montgomery County lies wholly within the Piedmont Plateau, the underlying formations being dominantly sandstone, shale, and diabase of Triassic age, with small strips of Paleozoic sandstone and limestone and even a bit of serpentinite toward the southeastern tip. Two areas here of special plant-geographic interest merit detailed discussion.

The serpentinite forms a dike which extends some 5 miles northeastward from Bryn Mawr, crossing the Schuylkill river at what is now known as Miquon, but was long named Lafayette. Some of the material in this is talc, a mineral so soft that it is known colloquially as soapstone; this was quarried on both sides of the river, first by the Indians, and by the white man up to the beginning of this century. Northeast of the river this dike marks the boundary between Montgomery and Philadelphia counties, and it is often unclear in which individual plant collections have been made.

According to the labels of specimens preserved in the herbaria of the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, the botanical interest of this geological formation was first recognized by a Dr. Gavin Watson, a Scotch physician temporarily resident here, whose collection of *Cheilanthes lanosa* is dated 1845. It was not until 15 years later, however, that thorough exploration began, by a group of amateur botanists, making a hobby of plant-collecting.

On Ocober 16, 1860, William Wynne Wister, a Germantown banker whose interest in plants had been aroused by Thomas Nuttall, collected the Climbing Milkweed, now known as *Matelea obliqua,* which, it may be noted, still grows here. The following year on June 12 he added *Woodsia obtusa,* and on July 15 *Hystrix patula* var. *bigeloviana;* these are now extinct, but on October 18, 1862, he pressed *Chenopodium standleyanum,* which continues to reseed each year.

The serpentinite dike is traversed by veins of dolomite and related minerals which yield enough lime to encourage calcicolous plants. Most famous of these is the remarkable fern hybrid found along with its parents on the outcrop of the dike southwest of the Schuylkill by R. R. Scott, a Philadelphia business man, in 1861 and named by him in 1865 *Asplenium ebenoides.* The habitat must have been unusually favorable for this generally rare plant, for multiple specimens obtained by successive collectors on both sides of the river have found their way into numerous herbaria. Mr. Scott failed to keep a type specimen, but presented a frond from his original plant to another amateur, Charles S. Williamson; this was included in the latter's herbarium presented to the University of Pennsylvania, and is held here as a clasotype. (Actually Scott's epithet may not be valid, since an earlier one was applied to what appears to have been the same hybrid which arose in a British culture). The parents still grow here, but the hybrid has not been seen for 90 years.

Other calcicoles comprise: *Pellaea glabella,* by Aubrey H. Smith, a Philadelphia lawyer, in 1861; *Asplenium ruta-muraria,* by Charles F. Parker, a Camden bookbinder, 1866; *Cystopteris bulbifera* and the prairie grass *Bouteloua curtipendula,* favoring this habitat in our climate, by Isaac Burk, a Philadelphia tailor, in 1867; and *Pellaea atropurpurea* and *Quercus muhlenbergii,* respectively northeast and southwest of the river, by Charles E. Smith, an eminent civil engineer and executive, about 1875.

There is little of interest to be found here today. Not only has much rock been quarried away, but also aggressive weeds have come in, smothering out most of the rarities.

The second area of special plant-geographic interest lies toward the southeast corner of the County. Here outcropping strata of hard sandstone or quartzite of Cambrian geologic age form low southwest to northeast-trending ridges. This rock weathers to gravelly or sandy soil from which the rain leaches plant-nutrients, developing considerable acidity; the habitat is thus similar to those so extensive in the pine-barren country of southern New Jersey, as is reflected in the vegetation. The most notable concentration of "pine-barren-plants" occurred in a springy depression north of Edgehill road southeast of Willow Grove known as Frazier's Bog.

The earliest collection made from what is presumed to have been this spot was one of *Juncus scirpoides,* by Uselma C. Smith, a Philadelphia lawyer in October, 1888; he called the locality Rubicam, a nearby railroad station (now Crestmont). Its geographic interest was first recognized by Alexander Macelwee, a Scotch horticulturist who had come to this country in 1883; on July 23, ten years later, he collected there *Xyris torta, Aletris farinosa, Calopogon pulchellus,* *Magnolia virginiana,* and *Gaylussacia dumosa.* Further exploration in 1898 yielded Charles F. Saunders, a horticultural writer, *Agrostis altissima, Eleocharis tuberculosa, Scleria muhlenbergii, Habenaria cristata, Spiranthes tuberosa, Polygala cruciata* var. *aquilonia, Asclepias rubra, Viburnum nudum,* and *Aster novi-belgii.*

An account of this locality and the relations of its flora to the New Jersey Pine Barrens was published by Macelwee in the Proceedings of the Academy of Natural Sciences for 1900. Local botanists continued to visit it for some years, adding still more disjunct species to the list. The expansion of nearby real-estate developments in time lessened the water supply, encouraging copious invasion by formerly sparse shrubs, so that at present all that remains to mark the spot are a few Magnolia trees.

How fortunate it has been, that over the years so many men have found relaxation from their gainful activities in the collecting of native plants, preserving records of numerous notable occurrences.

Rumex hastatulus, A New Delaware County Taxon

In August, 1971, David L. Williams kindly drove me around trails in Ridley Creek State Park, — which is as yet unopened to the public — to inspect areas of ecological interest on which he is writing an M.S. thesis for Rutgers University. In a meadow southwest of the creek about midway between the boundaries, a strange *Rumex* was noted. While resembling a vigorous *R. acetosella,* it proved to be an annual with slender tap-root, marking it as *R. hastatulus* Baldwin. This is a southern lowland plant ranging northeastward on coastal sands to Massachusetts, but thus far unknown in Delaware County, or indeed in Pennsylvania at all. — EDGAR T. WHERRY.